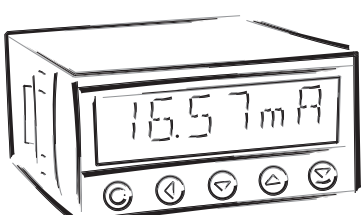
GUARANTEE
5
YEARS

OM 402PWR

4 DIGIT PROGRAMMABLE

AC VOLTMETER/AMMETER
NETS ANALYSER
WATTMETER



SAFETY INSTRUCTIONS

Please, read the enclosed safety instructions carefully and observe them!
These instruments should be safeguarded by isolated or common fuses (breakers)!
For safety information the EN 61 010-1 + A2 standard must be observed.
This instrument is not explosion-safe!

TECHNICAL DATA

Measuring instruments of the OM 402 series conform to the European regulation 89/336/EWG and the Ordinance 168/1997 Coll.

The instruments are up to the following European standards:
EN 55 022, class B
EN 61000-4-2, -4, -5, -6, -8, -9, -10, -11

The instruments are applicable for unlimited use in agricultural and industrial areas.

CONNECTION

Supply of energy from the main line has to be isolated from the measuring leads.

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2.1 Description

The OM 402PWR model is a universal 4-digit panel wattmeter with independent measuring of AC voltage/current, frequency, power factor and other quantities.
The instrument is based on an 8-bit microcontroller and precise RMS converter, which secures high accuracy, stability and easy operation of the instrument.

PROGRAMMABLE PROJECTION

Measured quantities	voltage (V_{RMS})
	current (A_{RMS})
	active power (P)
	frequency (Hz)
with calculation	idle power (Q)
	apparent power (S)
	power factor (cos φ)
Measuring range:	adjustable as fixed or with automatic change
Setting:	manual, it is possible to set arbitrary projection on the display for maximum value of the input signal in the menu, e.g. input 0...250 V/0...5 A ⇨ 0...1.500 kW
Projection:	-9999...9999

LINEARIZATION

Linearization:	by linear interpolation in 50 points (solely via OM Link)

DIGITAL FILTERS

Exponen.average:	from 2...100 measurements
Rounding:	setting the projection step for display

MATHEMATIC FUCTIONS

Min/max. value:	registration of min./max. value reached during measurement
Tare:	designed to reset display upon non-zero input signal
Peak value:	the display shows only max. or min. value
Mat. operations:	polynome, 1/x, logarithm, exponential, power, root, sin x

EXTERNAL CONTROL

Lock:	control keys blocking
Hold:	display/instrument blocking
Tare:	tare activation/resetting tare to zero
Resetting MM:	resetting min/max value
Memory:	data storage into instrument memory

2.2 Operation

The instrument is set and controlled by five control keys located on the front panel. All programmable settings of the instrument are performed in three adjusting modes:

LIGHT **Simple programming menu**
- contains solely items necessary for instrument setting and is protected by optional number code

PROFI **Complete programming menu**
- contains complete instrument menu and is protected by optional number code

USER **User programming menu**
- may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)
- acces without password

All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

OMLINK Complete instrument operation and setting may be performed via OM Link communication interface, which is a standard equipment of all instruments.

The operation program is freely accessible (www.orbit.merret.cz) and the only requirement is the purchase of OML cable to connect the instrument to PC. It is manufactured in version RS 232 and USB and is compatible with all ORBIT MERRET instruments. Another option for connection is with the aid of data output RS 232 or RS 485 (without the need of the OML cable).

The program OM LINK in „Basic" version will enable you to connect one instrument with the option of visualization and archiving in PC. The OM Link „Standard" version has no limitation of the number of instruments connected.

2.3 Options

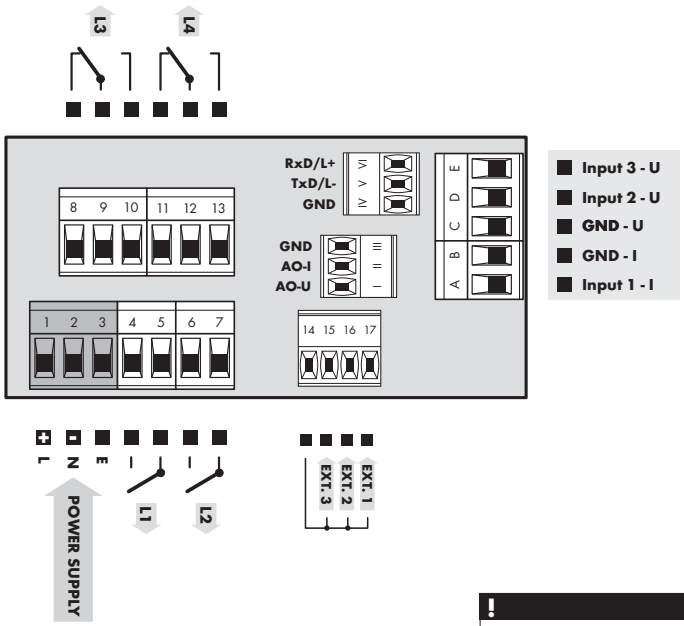
Comparators are assigned to monitor one, two, three or four limit values with relay output. The user may select limits regime: LIMIT/DOSING/FROM-TO. The limits have adjustable hysteresis within the full range of the display as well as selectable delay of the switch-on in the range of 0...99,9 s. Reaching the preset limits is signalled by LED and simultaneously by the switch-on of the relevant relay.

Data outputs are for their rate and accuracy suitable for transmission of the measured data for further projection or directly into the control systems. We offer an isolated RS232 and RS485 with the ASCII or DIN MessBus protocol.

Analog outputs will find their place in applications where further evaluating or processing of measured data is required in external devices. We offer universal analog output with the option of selection of the type of output - voltage/current. The value of analog output corresponds with the displayed data and its type and range are selectable in Menu.

Measured data record is an internal time control of data collection. It is suitable where it is necessary to register measured values. Two modes may be used. FAST is designed for fast storage (40 records/s) of all measured values up to 8 000 records. Second mode is RTC, where data record is governed by Real Time with data storage in a selected time segment and cycle. Up to 250 000 values may be stored in the instrument memory. Data transmis sion into PC via serial interface RS232/485 and OM Link.

The instrument supply leads should not be in proximity of the incoming low-potential signals.
Contactors, motors with larger input power should not be in proximity of the instrument.
The leads into the instrument input (measured quantity) should be in sufficient distance from all power leads and appliances. Provided this cannot be secured it is necessary to use shielded leads with connection to ground (bracket E).
The instruments are tested in compliance with standards for use in industrial area, yet we recommend to abide by the above mentioned principles.



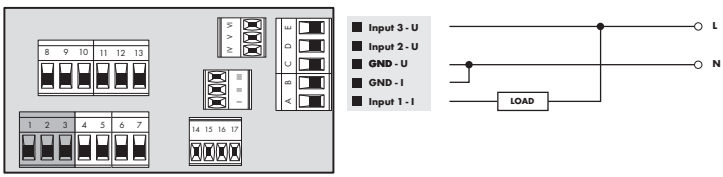
!

Clips GND - U and GND - I have galvanic connection

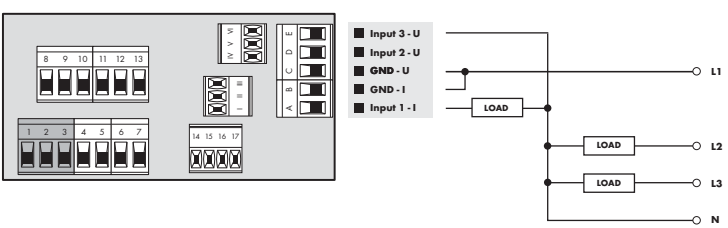
MEASURING RANGES

Range/Input	Input 1 - I	Range/Input	Input 2 - U	Input 3 - U
Range "K"	0...60/150/300 mV	**Range "S"**	0...10 V	0...120 V
Range "P"	0...1 (2,5)/5 A	**Range "U"**	0...250 V	0...450 V

CONNECTION FOR MEASURING ON ONE PHASE



CONNECTION FOR MEASURING ON ONE PHASE



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In case of connecting clips GND - U or GND - I to a phase, on this potential is subsequently the connector OM Link and secondary inputs.
It is necessary to abide by the precautions of hazardous contact with active parts of the instrument in compliance with relevant standards and regulations

Setting PROFI

- For expert users
- Complete instrument menu
- Access is password protected
- Possibility to arrange items of the „User" menu
- Tree menu structure

Setting LIGHT

- For trained users
- Only items necessary for instrument setting
- Access is password protected
- Possibility to arrange items of the „User" menu
- Linear menu structure

Setting USER

- For user operation
- Menu items are set by the user (Profi/Light) as per request
- Access is not password protected
- Optional menu structure either tree (PROFI) or linear (LIGHT)

4.1 Setting

The instrument is set and controlled by five control keys located on the front panel. All programmable settings of the instrument are performed in three adjusting modes:

LIGHT **Simple programming menu**
- contains solely items necessary for instrument setting and is protected by optional number code

PROFI **Complete programming menu**
- contains complete instrument menu and is protected by optional number code

USER **User programming menu**
- may contain arbitrary items selected from the programming menu (LIGHT/PROFI), which determine the right (see or change)
- acces without password

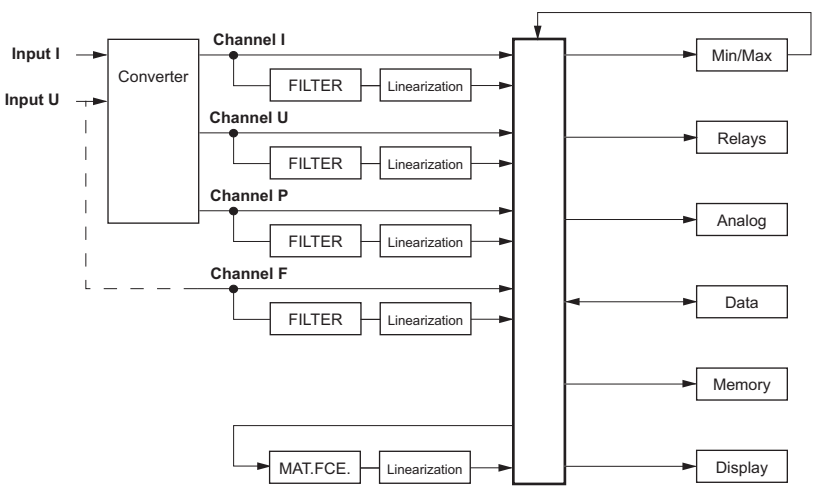
All programmable parameters are stored in the EEPROM memory (they hold even after the instrument is switched off).

Complete instrument operation and setting may be performed via OM Link communication interface, which is a standard equipment of all instruments.

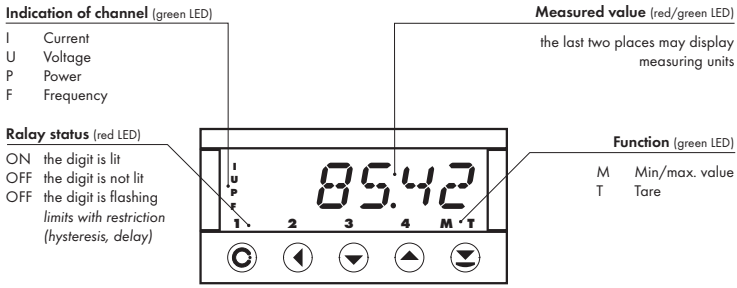
The operation program is freely accessible (www.orbit.merret.cz) and the only requirement is the purchase of OML cable to connect the instrument to PC. It is manufactured in version RS 232 and USB and is compatible with all ORBIT MERRET instruments.

Another option for connection is with the aid of data output RS 232 or RS 485 (without the need of the OML cable).

Scheme of processing the measured signal



Setting and controlling the instrument is performed by means of 5 control keys located on the front panel. With the aid of these keys it is possble to browse through the operation menu and to select and set required values.



Symbols used in the instructions

DEF values preset from manufacture

symbol indicates a flashing light (symbol)

inverted triangle indicates the item that can be placed in USER menu

broken line indicates a dynamic item, i.e. it is displayed only in particular selection/version

after pressing the key the set value will not be stored

after pressing the key the set value will be stored

continues on page 30

Setting the decimal point and the minus sign

DECIMAL POINT

Its selection in the menu, upon modification of the number to be adjusted it is performed by the control key ◀ with transition beyond the highest decade, when the decimal point starts flashing . Positioning is performed by ▲/▼.

THE MINUS SIGN

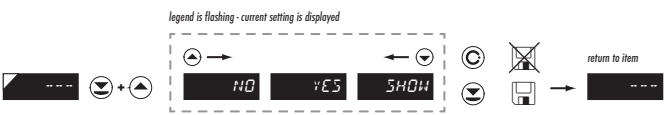
Setting the minus sign is performed by the key ▼ on higher decade. When editing the item substraction must be made from the current number (e.g..: 013 > ▼ , on class 100 > -87)

Control keys functions

Key	Measurement	Menu	Setting numbers/selection
C	access into USER menu	exit menu	quit editing
◀	programmable key function	back to previous level	move to higher decade
▼	programmable key function	move to previous item	move down
▲	programmable key function	move to next item	move up
▼▼	programmable key function	confirm selection	confirm setting/selection
▲ + ▼			numeric value is set to zero
C + ▼▼	access into LIGHT/PROFI menu		
C + ▼	direct access into PROFI menu		
▼▼ + ▲		configuration of an item for "USER" menu	
▼▼ + ▼		determine the sequence of items in "USER - LIGHT" menu	

Setting items into „USER“ menu

- in **LIGHT** or **PROFI** menu
- no items permitted in **USER** menu from manufacture
- on items marked by inverted triangle



NO	item will not be displayed in USER menu
YES	item will be displayed in USER menu with the option of setting
SHOW	item will be solely displayed in USER menu

5.0 Setting "LIGHT"

LIGHT **Simple programming menu**

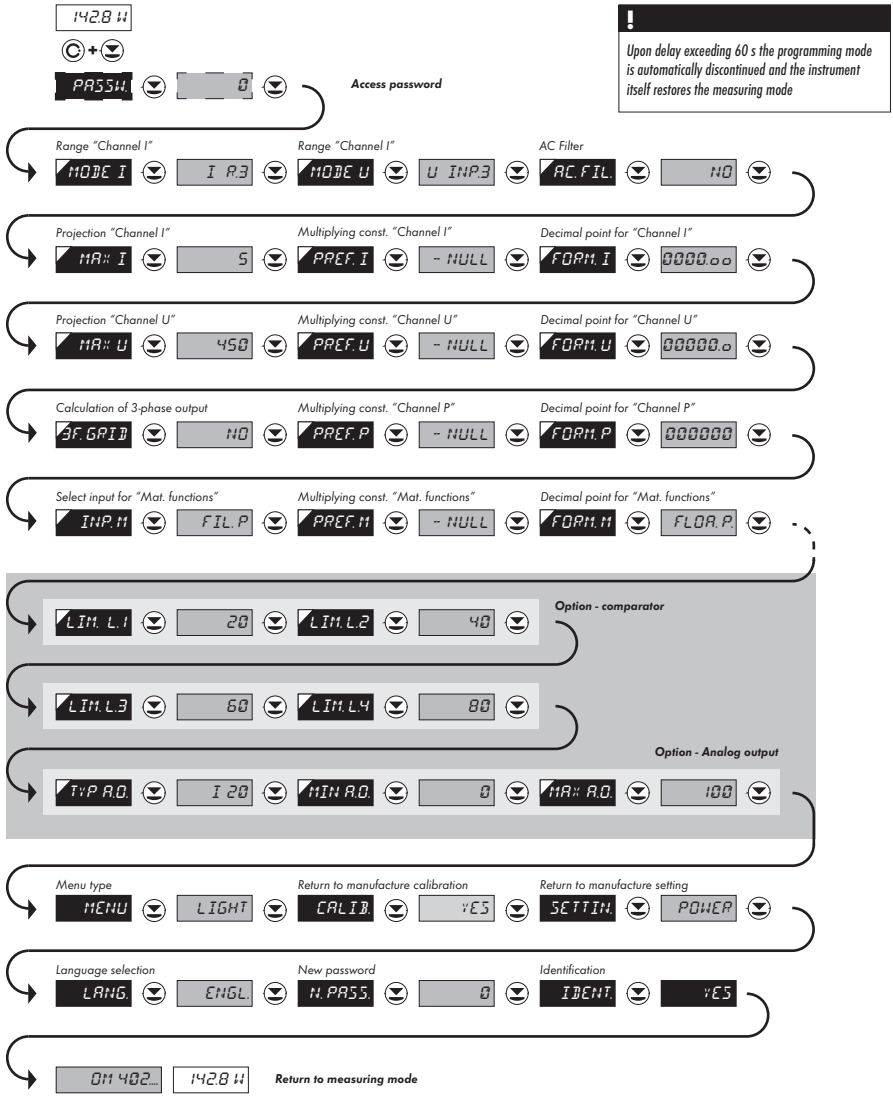
- contains only items necessary for instrument setting and is protected by optional number code

- **For capable users**
- **Only items necessary for instrument setting**
- **Access is password protected**
- **Possibility to arrange items of the „User" menu**
- **Linear menu structure**

Preset from manufacture	
Password	*"0"*
Menu	*LIGHT*
USER menu	*off*
Setting the items	DEF
Preset	*"Power"*

PROJECTION OF MEASURING UNITS ON THE DISPLAY

Channel/Unit	Multiplying constant		
	mili (0,001)	without (1)	kilo (1000)
"Channel I" - Current	mA	A	kA
"Channel U" - Voltage	mV	V	kV
"Channel P" - Active power	mW	W	kW
"Channel Fr" - Frequency	Hz	Hz	Hz
"S" - Apparent power	mVA	VA	kVA
"Q" - Idle power	mVAr	VAr	kVAr
"Cos Fi" - Power factor	--	--	--



!

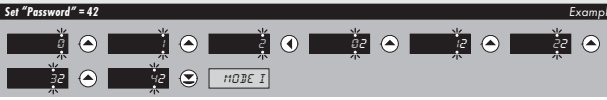
Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode

PASSW. **Access into instrument menu**

PAS = 0
- access into menu is unrestricted, after releasing keys you automaticaly move to first item of the menu

PAS > 0
- access into menu is protected ny number code

Set "Password" = 42 *Example*



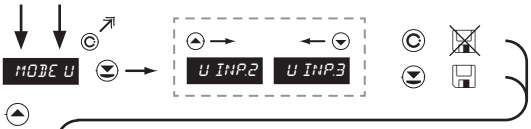
MODE I **Select measuring range of the instrument**

- settting of the input range depends on the ordered measuring range

MODE I	Menu	Range „K"	Range „P"
	I R.1	0...60 mV	0...1 A
	I R.2	0...150 mV	0...2,5 A
	I R.3	0...300 mV	0...5 A

DEF = I R.3 (Range "P")

Range: 0...150 mV *Example*



MODE U **Select measuring range of the instrument**

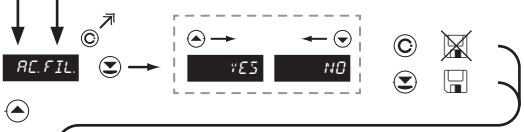
- setting of the input range depends on the ordered measuring range

DEF = U INP.3

MODE U	Menu	Range „S"	Range „U"
	U INP.2	0...10 V	0...250 V
	U INP.3	0...120 V	0...450 V

Range 0...250 V *Example*

U INP.3 → U INP.2 → AC.FIL



AC.FIL. **Input filter function - suppressing the DC component**

- allows for measurement solely of the AC component

DEF = NO

NO — Filter is off

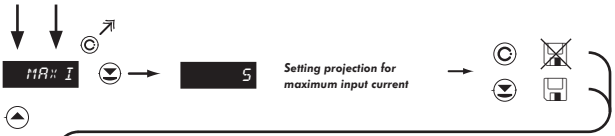
- measures both the DC and the AC component of the input signal

YES — Filter is on

- measures solely the AC component of input signal

Measurrement of alternating component only *Example*

NO → YES → MAX I

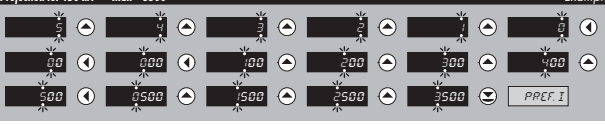


MAX I **Setting display projection for maximum value of input current**

- range of the setting -999...9999
- position of the DP does not affect display projection

DEF = 5

Projection for 150 mV > Max = 3500 *Example*



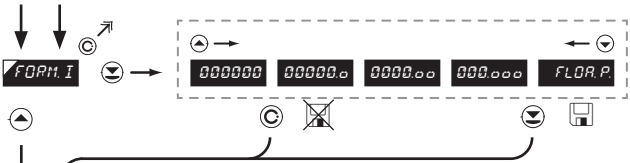
PREF I **Select the multiplying constant**

- the constant allows for another mathematical calculation with the option of extended projection of measuring units, display projection

DEF = 1 (- NULL)

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

Division constant 1000 > PREF. I = K-KILO *Example*



FORM.I **Setting projection of the decimal point**

DEF = 0000.oo

- positioning of the DP is set here in the measuring mode

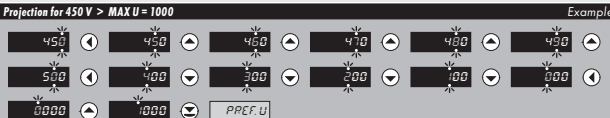
Projection of DP on display > 00000.o *Example*

MAX U **Setting display for maximum value of input current**

- range of the setting is -999...9999
- position of the DP does not affect display projection

DEF = 450

Projection for 450 V > MAX U = 1000 *Example*



PREF.U **Select multiplying constant**

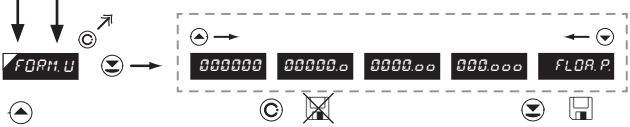
- constant allows for another mathematic recalculation with option of extended projection of measuring units, display projection

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

DEF = 1 (- NULL)

Division constant 1000 > PRE. I = K-KILO *Example*

-NULL ▲ K-KILO ▼ FORM.U



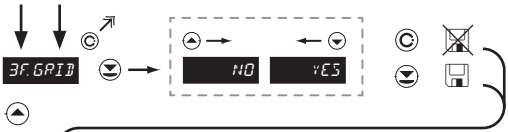
FORM.U **Setting projection of the decimal point**

DEF = 00000.o

- positioning of the DP is set here in the measuring mode

Projection of DP on display > 000000 *Example*

00000.o ▼ 000000 ▼ 3FGPID



3F.GRID **Select calulation for 3-phase network**

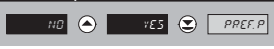
DEF = NO

NO Calculation is inactive

YES Calculation is active

- value is calculated with presumption of balanced take-off in all phases
- for P, S Q the value is multiplied by 3x

Calculation for 3-phase network > 3F. GRID = YES *Example*



PREF.P **Select multiplying constant**

- constant allows for another mathematic recalculation with option of extended projection of measuring units, display projection

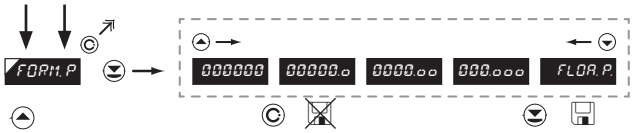
DEF = 1 (-NULL)

m-MILI Constant 0,001 prefix "m" added

-NULL Constant 1 without prexix

K-KILO Constant 1000 prefix "K" added

Division constant 1000 > PREF. I = K-KILO *Example*



FORM.P Setting projection of the decimal point

DEF = 000000

- positioning of the DP is set here in the measuring mode

Projection of DP on display > 00000.o — *Example*

INP.M. Select input for calculation of mathematic function

- select value from which mathematic function will be calculated

DEF = FIL. P

INPUT M	Menu	Description
	BAN	Mat. functions off
	FIL. I	From „Chan. I" after filtration
	FIL. U	From „Chan. U" after filtration
	FIL. P	From „Chan. P" after filtration
	FIL. F	From „Chan. F" after filtration
	MIN	From „Min. value"
	MAX	From „Max. value"
	S	From „Apparent power"
	Q	From „Idle power"
	COS. FI	From „Cos Fi"

Input Mat. functions from "Channel U" > INP. M=FIL. U — *Example*

PREF.M. Select multiplying constant

- constant allows for another mathematic recalculation with option of extended projection of measuring units, display projection

DEF = 1 (- NULL)

m-MILI	Constant 0,001 prefix "m" added
-NULL	Constant 1 without prexix
K-KILO	Constant 1000 prefix "K" added

Division constant 1000 > PREF. I = K-KILO *Example*

-NULL → K-KILO → FORM.M

FORM.M Setting projection of the decimal point

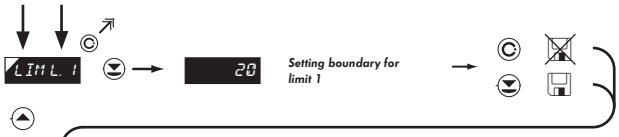
- positioning of the DP is set here in the measuring mode

DEF = FLOA. P.

Projection of DP on display > 000000 *Example*

FLOA. T → 000000 → FORM.P

**subsequent item on the menu depends on instrument equipment*



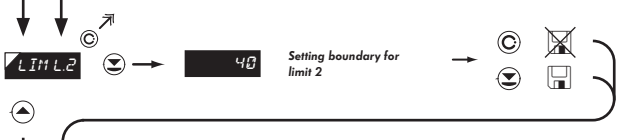
LIM L.1 **Setting boundary for limit 1**

- range of the setting is -99999...999999
- default "Hystresis"=0 "Delay"=0

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 20

Setting limit 1 > L 1 = 32 *Example*



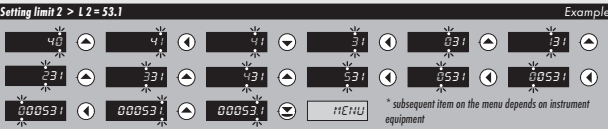
LIM L.2 **Setting boundary for limit 2**

- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 40

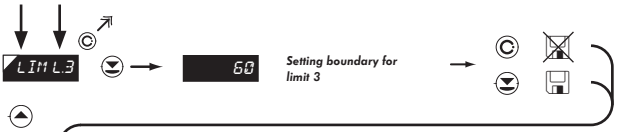
Setting limit 2 > L 2 = 53.1 *Example*



* subsequent item on the menu depends on instrument equipment

!

Items for "Limits" and "Analog output" are accessible only if incorporated in the instrument.



LIM L3 **Setting boundary for limit 3**

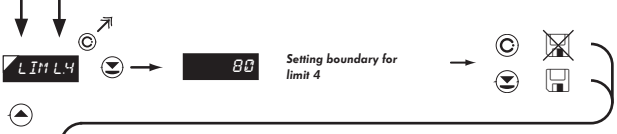
- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 60

Setting limit 3 > L3 = 85 *Example*

** subsequent item on the menu depends on instrument equipment*



LIM L4 **Setting boundary for limit 4**

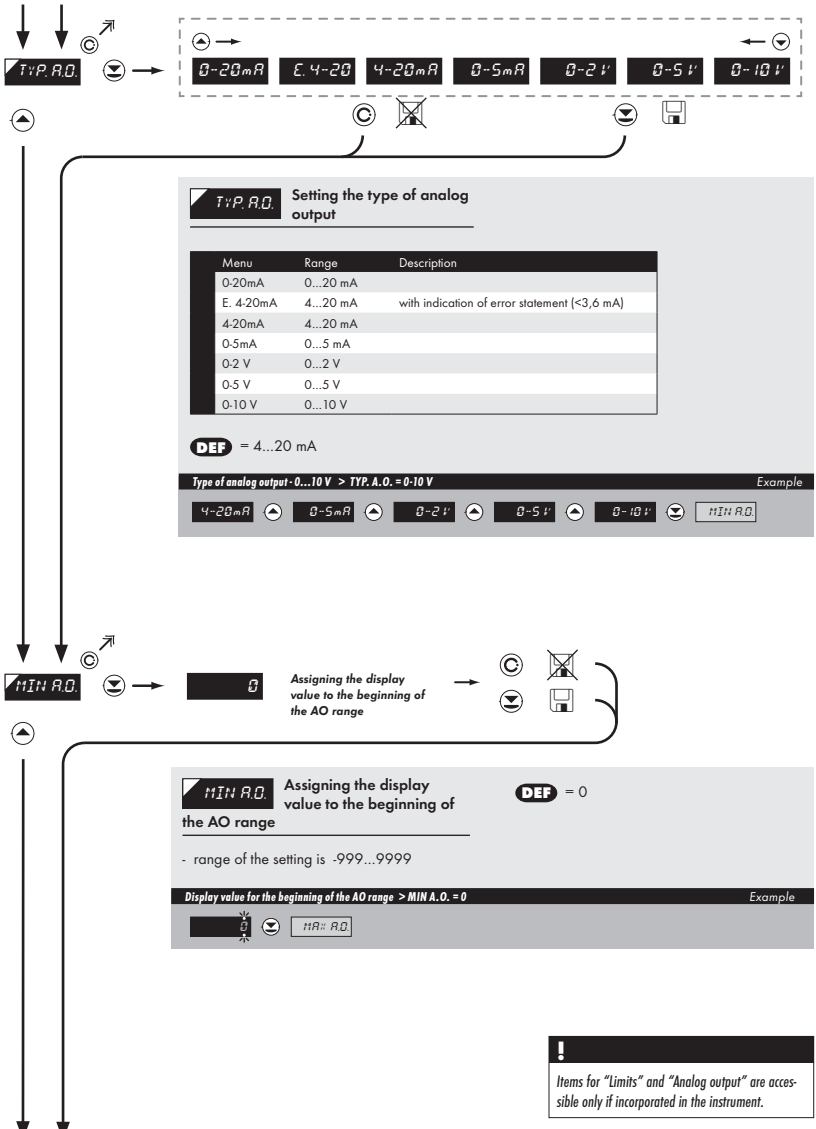
- range of the setting is -99999...999999
- default "Hysteresis"=0 "Delay"=0

- contingent modification of hysteresis or delay may be performed in "PROFI" menu

DEF = 80

Setting limit 4 > L4 = 103 *Example*

** subsequent item on the menu depends on instrument equipment*



TYP. A.O. Setting the type of analog output

Menu	Range	Description
0-20mA	0...20 mA	
E. 4-20mA	4...20 mA	with indication of error statement (<3,6 mA)
4-20mA	4...20 mA	
0-5mA	0...5 mA	
0-2 V	0...2 V	
0-5 V	0...5 V	
0-10 V	0...10 V	

DEF = 4...20 mA

Type of analog output - 0...10 V > TYP. A.O. = 0-10 V *Example*

4-20mA ▲ 0-5mA ▲ 0-2 V ▲ 0-5 V ▲ 0-10 V ▼ MIN A.O.

MIN A.O. Assigning the display value to the beginning of the AO range

DEF = 0

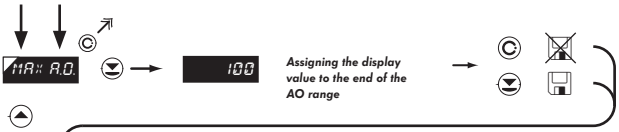
- range of the setting is -999...9999

Display value for the beginning of the AO range > MIN A.O. = 0 *Example*

0 ▼ MIN A.O.

!

Items for "Limits" and "Analog output" are accessible only if incorporated in the instrument.

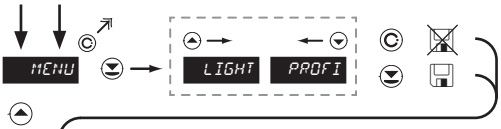


MAX A.O. **Assigning the display value to the end of the AO range**

DEF = 100

- range of the setting is -999...9999

Display value for the end of the AO range > MAX A.O. = 120 *Example*



MENU **Setting the menu type LIGHT/PROFI**

LIGHT > menu LIGHT, a simple menu, which contains only the most essential items necessary for instrument setting
> linear tree structure

PROFI > menu PROFI, a complete menu for complete instrument setting
> tree menu structure

DEF = LIGHT

Menu LIGHT > MENU = LIGHT *Example*

CALIB. **Restoration of manufacture calibration**

- in the event of error calibration it is feasible to restore manufacture calibration.

Prior to execution of any modifications you will be asked to confirm your selection. (YES)

Restoration of manufacture setting > CALIIB. *Example*

SETTIN. **Restoration of manufacture instrument setting**

- in the event of error setting or calibration it is possible to return to manufacture setting. Prior to execution of changes you will be asked to confirm your selection (YES)
- reading manufacture calibration and primary setting of items in menu (DEF)

Restore manufacture

Presetting constants and evaluation

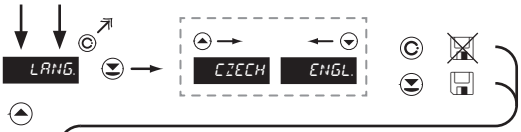
- presetting "source" for further evaluation (e.g.: select "VOLTAGE" > evaluation of limits, analog, min/max. value, etc... from "Channel U"

POWER Setting for measurement of power output - "Channel P"

VOLTAG. Setting for measurement of voltage - "Channel U"

CURREN. Setting for measurement of current - "Channel I"

Restoration of manufacture setting > SETTIN. *Example*



LANG. **Selection of language in instrument menu**

- selection of language version of the instrument menu

DEF = ENGL.

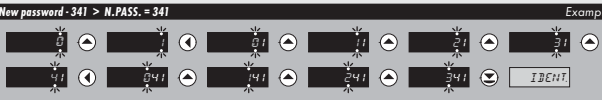
Language selection - ENGLISH > LANG. = ENGL. *Example*

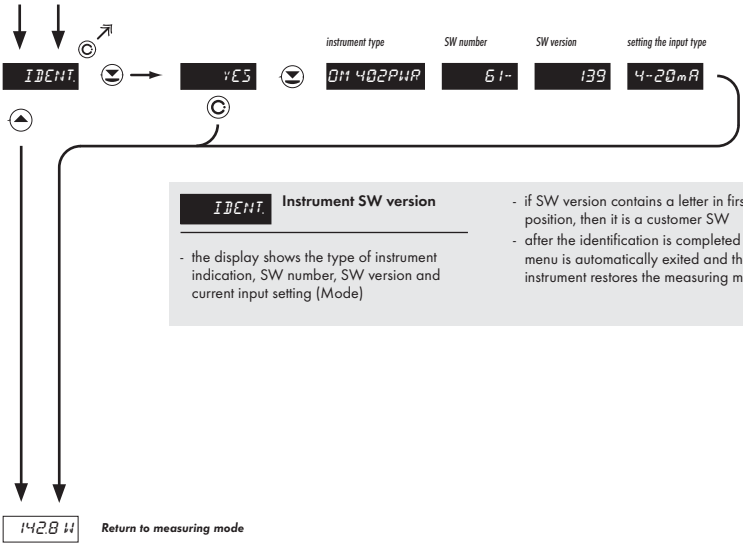
N.PASS. **Setting new access password**

- access password for menu LIGHT/PROFI
- range of the number code 0...9999
- upon setting the password to "000" the access to menu LIGHT/PROFI is free without prompt to enter it
- in the event of loss universal password "8177" may be used

DEF = 0

New password - 341 > N.PASS. = 341 *Example*





IDENT. Instrument SW version

- the display shows the type of instrument indication, SW number, SW version and current input setting (Mode)
- if SW version contains a letter in first position, then it is a customer SW
- after the identification is completed the menu is automatically exited and the instrument restores the measuring mode

6.0 Setting "PROFI"

PROFI **Complete programming menu**

- contains complete instrument menu and is protected by optional number code
- designed for expert users
- preset from manufacture is menu **LIGHT**

- **For expert users**
- **Complete instrument menu**
- **Access is password protected**
- **Possibility to arrange items of the „User" menu**
- **Tree menu structure**

Switching over to "PROFI" menu

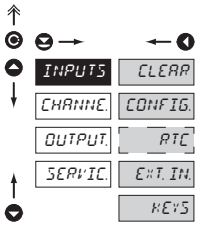
- temporary switch-over to **PROFI** menu, which is suitable to edit a few items
- after quitting **PROFI** menu the instrument automatically switches to **LIGHT** menu
- access is password protected (if it was not set under item N. PASS. =0)

- access into **LIGHT** menu and transition to item „MENU" with subsequent selection of „PROFI" and confirmation
- after re-entering the menu the **PROFI** type is active
- access is password protected (if it was not set under item N. PASS. =0)

PROJECTION OF MEASURING UNITS ON THE DISPLAY

Channel/Unit	Multiplying constant		
	mili (0,001)	bnull (1)	kilo (1000)
"Channel I" - Current	mA	A	kA
"Channel U" - Voltage	mV	V	kV
"Channel P" - Active power	mW	W	kW
"Channel Fr" - Frequency	Hz	Hz	Hz
"S" - Apparent power	mVA	VA	kVA
"Q" - Idle power	mV r	VA r	kV r
"Cos Fi" - Power factor	--	--	--

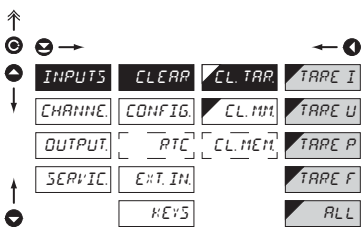
6.1 Setting "PROFI" - INPUT

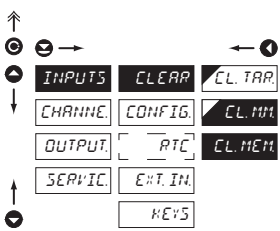


The primary instrument parameters are set in this menu

- CLEAR — Resetting internal values
- CONFIG. — Selection of measuring range and parameters
- RTC — Setting date and time for option with RTC
- EXT. IN. — Setting external inputs functions
- KEYS — Assigning further functions to keys on the instrument

6.1.1 Resetting internal values





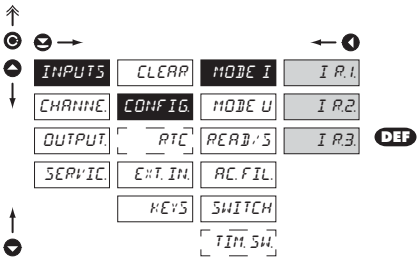
CLEAR — Resetting internal values

- TARE I — Tare resetting channel - Current
- TARE U — Tare resetting channel - Voltage
- TARE P — Tare resetting channel - Power
- TARE F — Tare resetting channel - Frequency
- ALL — Tare resetting on all channels

- CL. M.M. — Resetting min/max value
  - resetting memory for the storage of minimum and maximum value achieved during measurement

- CL. MEM. — Resetting the instrument memory
  - resetting memory with data measured in the "FAST" or "RTC" modes
  - not in standard equipment

6.1.2a Select measuring mode - Measuring channel I

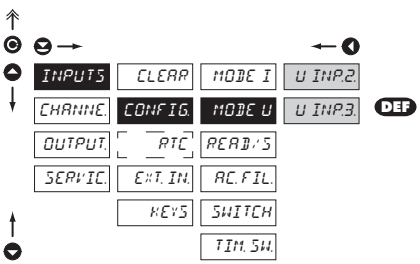


MODE I **Select measuring range - Current**

- selection of measuring range depends on the ordered version

I R.1.	Range 1 0...60 mV/1 A
I R.2.	Range 2 0...150 mV/2,5 A
I R.3.	Range 3 0...300 mV/5 A

6.1.2b Select measuring range - Measuring channel U

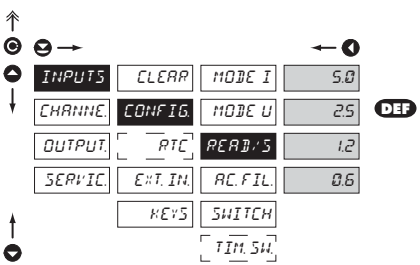


MODE U **Select measuring range - Voltage**

- selection of measuring range (input) depends on the ordered version

U INP.2	Voltage input 2 0...10 V/250 V
U INP.3	Voltage input 2 0...120 V/450 V

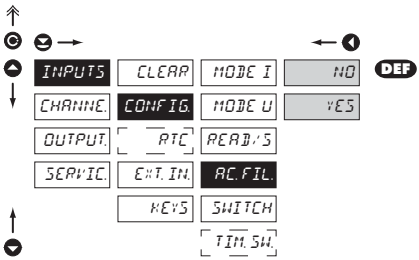
6.1.2c Selection of measuring rate



READ/S **Selection of measuring rate**

5.0	5,0 measurements/s
2.5	2,5 measurements/s
1.2	1,2 measurements/s
0.6	0,6 measurements/s

6.1.2d Select function of input filter



AC.FIL. Input filter function - supressing DC component

- allows for measurement of alternating component of the input signal

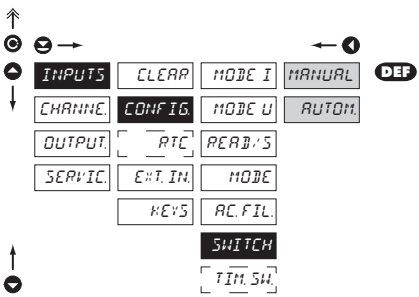
NO Filter is off

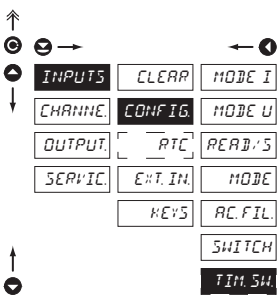
- measures both DC and AC components of the input signal

YES Filter is on

- measures only AC component of the input signal

6.1.2e Select projection of measuring channels





SWITCH Select switching of projection of measuring channels

- in this menu it s possible to select switching for projection of measuring channels I, U, P, F, MF
- selection of quantities for switching can be set separately for individual channels (e.g. for Channel I >> *"CHANNELS > CHAN. I > SWITCH."*)

MANUAL Manual switching of projection

- projection may be switched by selected button *("INPUT > BUTTON")* or external input *("INPUT > EXT. IN.")*

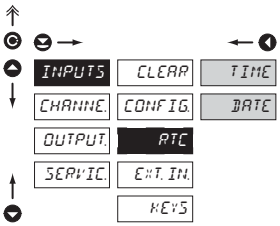
AUTOM. Switching of projection is automatic

- switching time is adjustable in item *"TIM. SW."*

TIM.SW. Setting switching interval for projection

- time is adjustable in range 0,5...99,9 s
- DEF = 2

6.1.3 Setting real time clock



RTC **Setting the real time clock (RTC)**

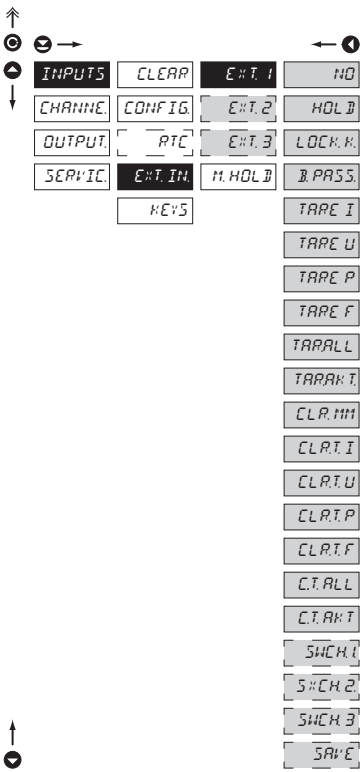
TIME Time setting

- format 23.59.59

DATE Date setting

- format DD.MM.YY

6.1.4a Select function of external input



EXT. IN. **External input function selection**

NO Input is off

HOLD Activation of HOLD

LOCK. K. Locking keys on the instrument

D. PASS. Activation of locking access into programming menu LIGHT/PROFI

TARE I Tare activation for "Channel I"

TARE U Tare activation for "Channel U"

TARE P Tare activation for "Channel P"

TARE F Tare activation for "Channel F"

TAR. ALL Tare activation on all channels

TAR. AKT. Tare activation on active channel

CLR. MM Resetting min/max value

CLR. T. I Clear Tare for "Channel I"

CLR. T. U Clear tare for "Channel U"

CLR. T. P Tare clear for "Channel P"

Table with control of external inputs

Channel	*EXT. 1*	*EXT. 2*	*EXT. 3*
I	*0*	*0*	
U	*0*	*1*	
P	*1*	*0*	
F	*1*	*1*	
MF	*0*	*0*	*1*
cos 02	*0*	*1*	*1*
Min	*1*	*0*	*1*
Max	*1*	*1*	*1*

*****

Setting procedure is identical for EXT. 2 and EXT. 3

CLR. T.F Clear tare for "Channel F"

C.T.ALL Clear tare on all channels

C.T.ACT. Clear tare on active channel

SWCH. 1 Successive switching of channels projection

SWCH. 2 BCD switching of channels projection - Ext. 1, 2

- control see table
- after selecting this option setting for "INPUT 2" is automatically banned

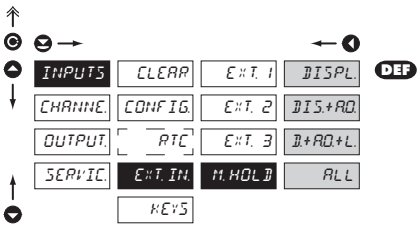
SWCH. 3 BCD switching of channels projection - EXT. 1, 2, 3

- control see table
- after selecting this option setting for *"EXT. 2"* and *"EXT. 3"*

SAVE Activation of measured data record in instrument memory (not in standard equipment)

- DEF EXT. 1 > HOLD
- DEF EXT. 2 > LOCK. K.
- DEF EXT. 3 > SWCH. 1

6.1.4b Selection of function "HOLD"



M.HOLD **Selection of function "HOLD"**

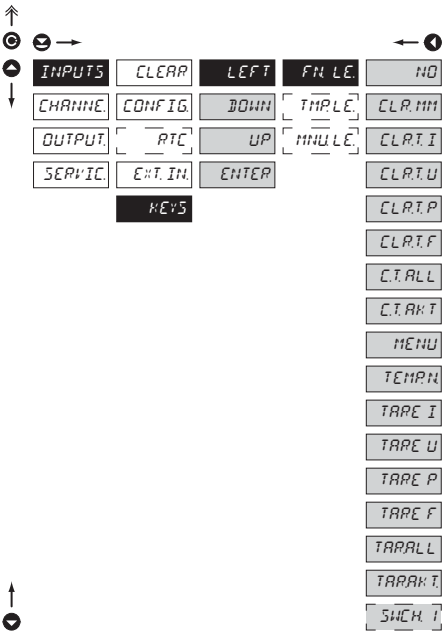
DISPL. "HOLD" locks only the value displayed

DIS.+AO. "HOLD" locks the value displayed and on AO

D.+AO.+L. "HOLD" locks the value displayed, on AO and limit evaluation

ALL "HOLD" locks the entire instrument

6.1.5a Optional accessory functions of the keys



!

Preset values of the control keys **DEF**:

Presetting measurement > POWER	
LEFT	*Current (Chan. I)*
UP	*Frequency (Chan. F)*
DOWN	*Voltage (Chan. U)*
ENTER	*cos fi (Mat. Fn.)*
Presetting measurement > VOLTAGE	
LEFT	*Current (Chan. I)*
UP	*Frequency (Chan. F)*
DOWN	*Power (Chan. P)*
ENTER	*cos fi (Mat. Fn.)*
Presetting measurement > CURRENT	
LEFT	*Power (Chan. P)*
UP	*Frequency (Chan. F)*
DOWN	*Voltage (Chan. U)*
ENTER	*cos fi (Mat. Fn.)*

!

Setting is identical for LEFT, DOWN, UP and ENTER

FN. LE. Assigning further functions to instr. keys

- *„FN. LE."* > executive functions
- *„TMP. LE."* > temporary projection of selected values
- *„MNU. LE."* > direct access into menu on selected item

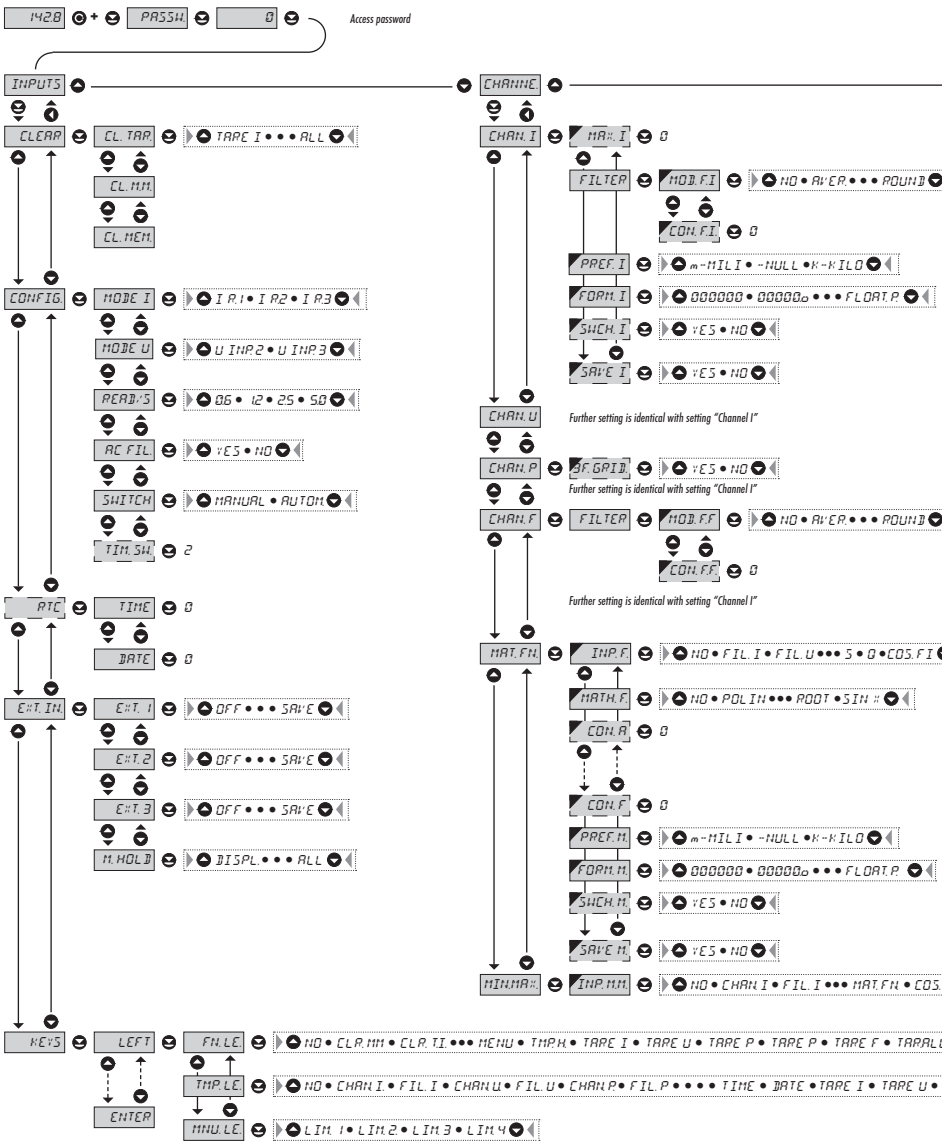
NO	Key has no further function
CLR.MM	Resetting min/max value
CLR.T.I	Clear tare for "Channel I"
CLR.T.U	Clear tare for "Channel U"
CLR.T.P	Clear tare for "Channel P"
CLR.T.F	Clear tare for "Channel F"
C.T.ALL	Clear tare on all channels
C.T.AKT.	Clear tare on active channel
MENU	Direct access into menu on selected item

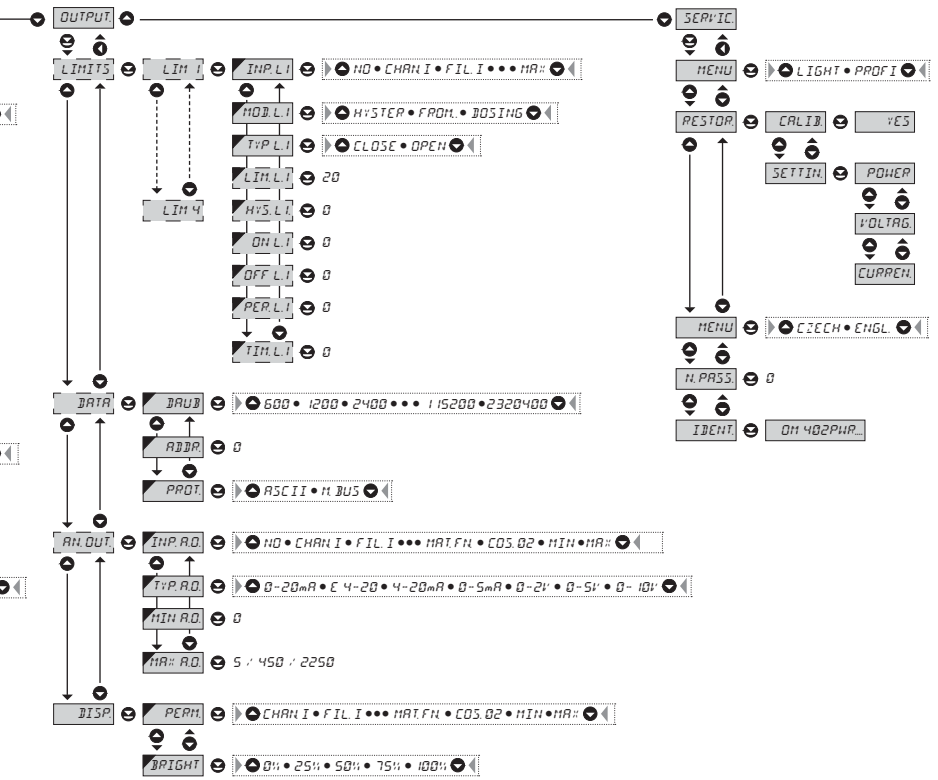
- after confirmation of this selection the *"MNU. LE."* item is displayed on superior menu level, where required selection is performed

TEMP. N.	Temporary projection of selected values

- after confirmation of this selection the item *"TMP. LE."* is displayed on superior menu level, where required selection is performed

TARE I	Tare activation for "Channel I"
TARE U	Tare activation for "Channel U"
TARE P	Tare activation for "Channel P"
TARE F	Tare activation for "Channel F"
TAR.ALL	Tare activation on all channels
TAR.AKT.	Tare activation on active channel
SWCH. I	Successive switching of channels projection


1428
PASSW.
0
Access password
INPUTS
CLEAR
CL. TAR.
TARE I • • • ALL
CL. MM
CL. MEM.
CONFIG.
MODE I
I R.1 • I R2 • I R3
MODE U
U INP.2 • U INP.3
READ'S
06 • 12 • 25 • 50
AC. FIL.
YES • NO
SWITCH
MANUAL • AUTOM
TIM. SW.
2
RTC
TIME
0
DATE
0
EXT. IN.
EXT. 1
OFF • • • SAVE
EXT. 2
OFF • • • SAVE
EXT. 3
OFF • • • SAVE
M. HOLD
DISPL. • • • ALL
KEYS
LEFT
ENTER
FN. LE.
TMP. LE.
MNU. LE.
NO • CLR.MM • CLR.TI • • • MENU • TMP.H • TARE I • TARE U • TARE P • TARE P • TARE F • TARALL
LIM. 1 • LIM.2 • LIM.3 • LIM.4
CHANNE
CHAN. I
MA%. I
0
FILTER
MOD. FI
NO • AVER. • • • POUND
CON. FI.
0
PREF. I
m-MILI • -NULL • K-KILO
FORM. I
000000 • 00000.0 • • • FLOAT.P.
SWCH. I
YES • NO
SAVE I
YES • NO
CHAN. U
Further setting is identical with setting "Channel I"
CHAN. P
GR. GRID
YES • NO
Further setting is identical with setting "Channel I"
CHAN. F
FILTER
MOD. FF
NO • AVER. • • • POUND
CON. FF.
0
Further setting is identical with setting "Channel I"
MAT. FN.
INP. F.
NO • FIL. I • FIL. U • • • S • Q • COS. FI
MATH. F.
NO • POLIN • • • ROOT • SIN %
CON. A
0
CON. F
0
PREF. M.
m-MILI • -NULL • K-KILO
FORM. M.
000000 • 00000.0 • • • FLOAT.P.
SWCH. M.
YES • NO
SAVE M.
YES • NO
MIN.MA%
INP. M.M.
NO • CHAN I • FIL. I • • • MAT.FN • COS.



02

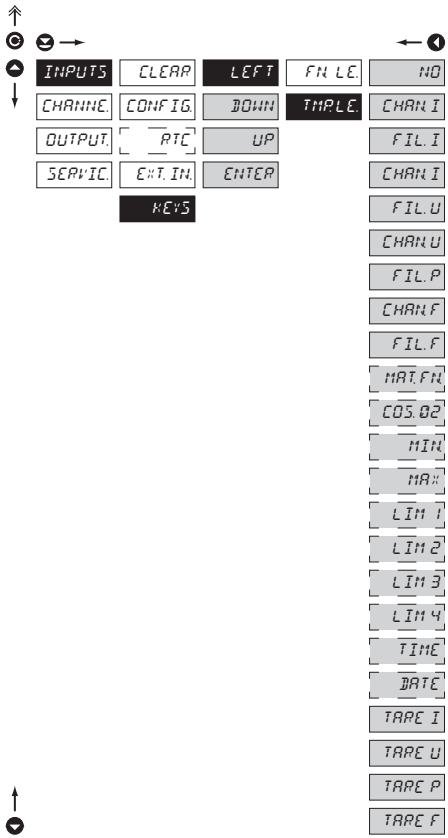
L • TARA: T • SWCH. 1

TARE P • TAR F

!

Upon delay exceeding 60 s the programming mode is automatically discontinued and the instrument itself restores the measuring mode

6.1.5b Optional accessory functions of the keys - Temporary projection



> **!**
> *Setting is identical for LEFT, DOWN, UP and ENTER*

> **!**
> *"COS. 02" is derived from "COS. FI." when the range -1...1 is tranferred to 0...2 for evaluation*

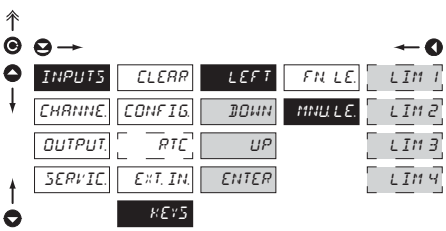
TMP.LE. Temporary projection of selected item

- "Temporary" projection of selected value is displayed for the time of keystroke
- "Temporary" projection may be switched to permanent by pressing ⊙ + "Selected key", this holds until the stroke of any key

NO	Temporary projection is off
CHAN. I	Temporary projection of "Channel I" value
FIL. I	Temporary projection of "Channel I" value after processing digital filters
CHAN. U	Temporary projection of "Channel U" value
FIL. U	Temporary projection of "Channel U" value after processing digital filters
CHAN. P	Temporary projection of "Channel P" value
FIL. P	Temporary projection of "Channel P" value after processing digital filters
CHAN. F	Temporary projection of "Channel F" value
FIL. F	Temporary projection of "Channel F" value after processing digital filters
MAT. FN.	Temporary projection of "Mathematic functions" value
COS. 02	Temporary projection of auxiliary channel cos fi (range 0-2)
MIN	Temporary projection of "Min. value"
MAX	Temporary projection of "Max. value"
LIM 1	Temporary projection of "Limit 1" value
LIM 2	Temporary projection of "Limit 2" value
LIM. 3	Temporary projection of "Limit 3" value

LIM.4	Temporary projection of "Limit 4" value
TIME	Temporary projection of "TIME" value
DATE	Temporary projection of "DATE" value
TARE I	Tare value for "Channel I"
TARE U	Tare value for „Channel U"
TARE P	Tare value for "Channel P"
TARE F	Tare value for "Channel F"

6.1.5c Optional accessory functions of the keys - Direct access to item

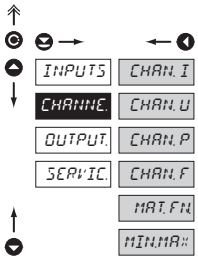


MNU LE.	**Assigning access to selected menu item**
LIM 1	Direct access to item "LIM 1"
LIM 2	Direct access to item "LIM 2"
LIM 3	Direct access to item "LIM 3"
LIM 4	Direct access to item "LIM 4"

!

Setting is identical for LEFT, DOWN, UP and ENTER

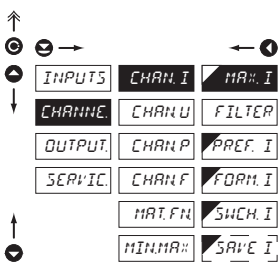
6.2 Setting "PROFI" - CHANNELS



The primary instrument parameters are set in this menu

- CHAN.I — Setting parameters of measuring "Channel I"
- CHAN.U — Setting parameters of measuring "Channel U"
- CHAN.P — Setting parameters of measuring "Channel P"
- CHAN.F — Setting parameters of measuring "Channel F"
- MAT.FN. — Setting parameters of mathematic functions
- MIN.MAX — Selection of access and evaluation of Min/max value

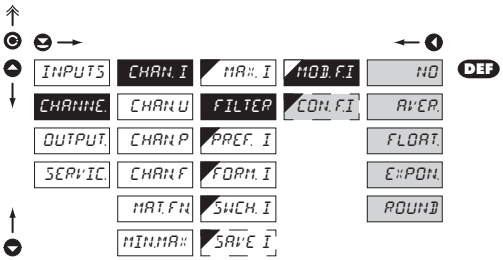
6.2.1a Display projection for "Channel I"



MAX. I — Setting display projection for minimum value of input signal

- range of the setting is -99999...999999
- DEF = 5

6.2.1b Digital filters



MOD.F.I **Selection of digital filters**

- at times it is useful for better user projection of data on display to modify it mathematically and properly , wherefore the following filters may be used:

NO Filters are off

AVER. Measured data average

- arithmetic average from given number („CON.F. A.") of measured values
- range 2...100

FLOAT. Selection of floating filter

- floating arithmetic average from given number („CON.F. A.") of measured data and updates with each measured value
- range 2...30

EXPON. Selection of exponential filter

- integration filter of first prvního grade with time constant („CON.F. A.") measurement
- range 2...100

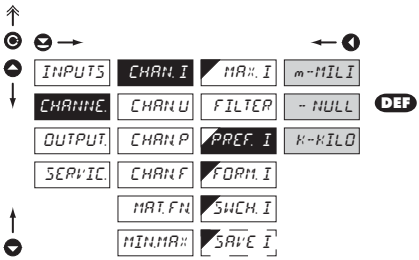
ROUND Measured value rounding

- is entered by any number, which determines the projection step (e.g: "CON.F. A."=2,5 > display 0, 2.5, 5,...)

CON.F.A. Setting constants

- this menu item is always displayed after selection of particular type of filter
- **DEF** = 2

6.2.1d Select multiplying constant

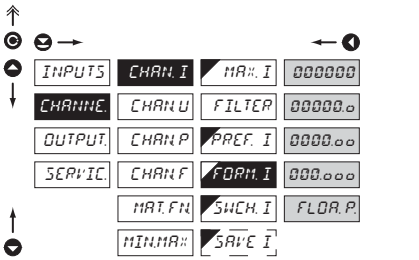


PREF. I **Select multiplying constant**

- constant allows for another mathematic recalculation with option of extended projection of measuring units

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

6.2.1d Projection format - positioning of decimal point



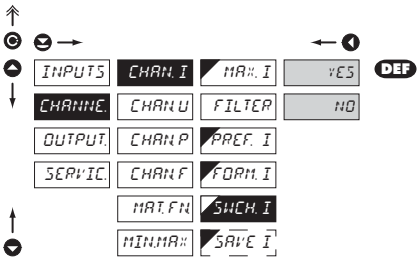
FORM. I **Selection of decimal point**

- the instrument allows for classic projection of a number with positioning of the DP as well as projection with floating DP, allowing to display a number in its most exact form *„FLOAT.P."*

000000.	Setting DP - XXXXXX.
00000.o	Setting DP - XXXXX.x
0000.oo	Setting DP - XXXX.xx
000.ooo	Setting DP - XXX.xxx
FLOA.P.	Floating DP

DEF "Channel I" - 000.ooo
DEF "Channel U" - 00000.o
DEF "Channel P" - 000000
DEF "Channel F" - 0000.oo

6.2.1e Select channel projection during switching



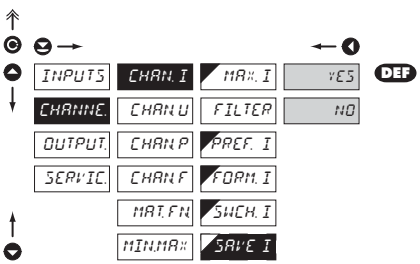
SWCH. I **Select channel projection during switching**

- setting in this item enables the user to select individual measuring channels, which will be displayed during switching function channels „SWCH. 1"

YES — Projection permitted

NO — Projection prohibited

6.2.1f Selection of storing data into instrument memory



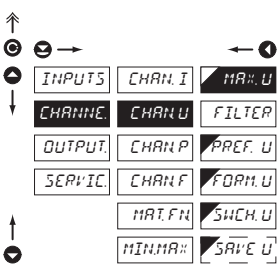
SAVE I **Selection of storing data into instrument memory**

- by selection in this item you allow to register values into instrument memory
- another setting in item "OUTPUT. > MEMORY" (not in standard experiment)

YES — Measured data are stored in the memory

NO — Measured data are not stored

6.2.2a Display projection for "Channel U"



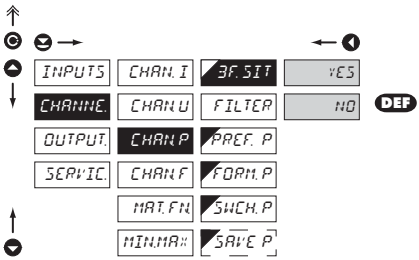
MAX. U Setting display projection for minimum value of input signal

- range of the setting is -99999...999999
- DEF = 450

!

Further setting is identical with setting "Channel I"

6.2.3a Setting parameters for "Channel P"



3F.SIT **Calculation of 3-phase power**

NO — Calculation is off

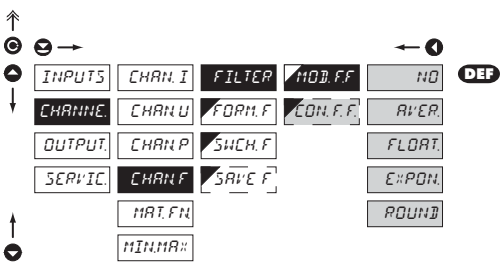
YES — Calculation is on

- value is calculated with presumption of balanced take-off on all phases
- for P, S Q the value is multiplied by 3x

!

Further setting is identical with setting "Channel I"

6.2.4a Setting parameters for "Channel F"



MOD.FF **Setting digital filters**

- sometimes, it is useful for better user projection of data on display to aptly modify it mathematically and to that purpose the following filters may be used

NO — Filters are off

AVER. — Averaging of measured value

FLOAT. — Select floating filter

EXPON. — Select exponential filter

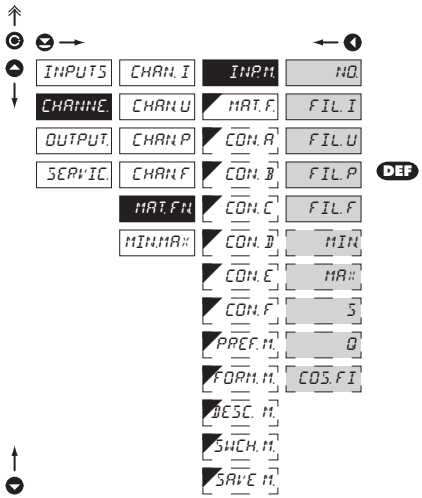
ROUND — Rounding measured value

CON.F.F. — Setting constant

!

Further setting is identical with setting "Channel I"

6.2.5a Mathematic functions - select input

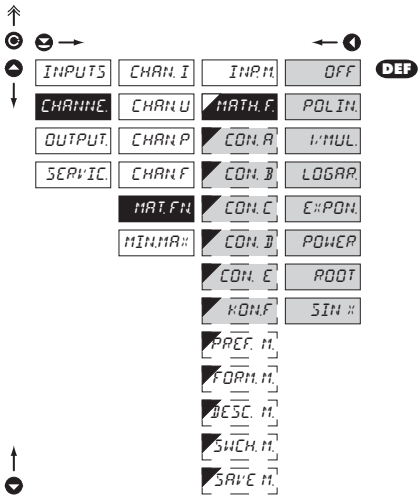


INP.M. Select input for calculation of mat. function

- select value from which mathematic function is calculated

NO	Mathematic functions are off
FIL.I	From "Channel I" after modification by digital filter
FIL.U	From "Channel U" after modification by digital filter
FIL.P	From "Channel P" after modification by digital filter
FIL.F	From "Channel F" after modification by digital filter
MIN	From "Min. value"
MAX	From "Max. value"
5	From "Apparent power"
0	From "Idle power"
COS.FI	From "cos fi"

6.2.5b Mathematic functions



MATH.F. **Select mathematic functions**

OFF Mathematic functions are off

POLIN Polynome

$$Ax^5 + Bx^4 + Cx^3 + Dx^2 + Ex + F$$

1/MUL. 1/x

$$\frac{A}{x^5} + \frac{B}{x^4} + \frac{C}{x^3} + \frac{D}{x^2} + \frac{E}{x} + F$$

LOGAR. Logarithm

$$A \times \ln\left(\frac{Bx + C}{Dx + E}\right) + F$$

EXPON. Exponential

$$A \times e^{\left(\frac{Bx+C}{Dx+E}\right)} + F$$

POWER Power

$$A \times (Bx + C)^{(Dx+E)} + F$$

ROOT Root

$$A \times \sqrt{\frac{Bx + C}{Dx + E}} + F$$

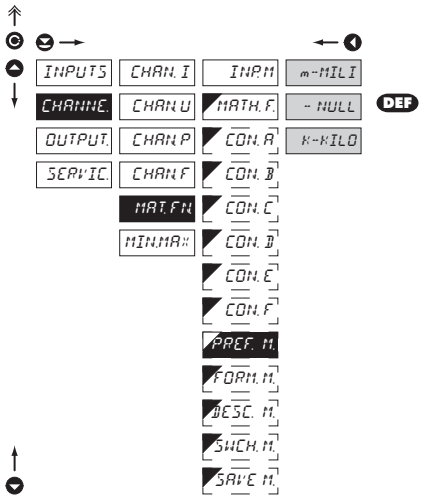
SIN x Sin x

$$A\sin^5 x + B\sin^4 x + C\sin^3 x + D\sin^2 x + E\sin x + F$$

CON. - Setting constants for calculation of mat. functions

- this menu is displayed only after selection of given mathematic function

6.2.5c Mathematic functions - select multiplying constant

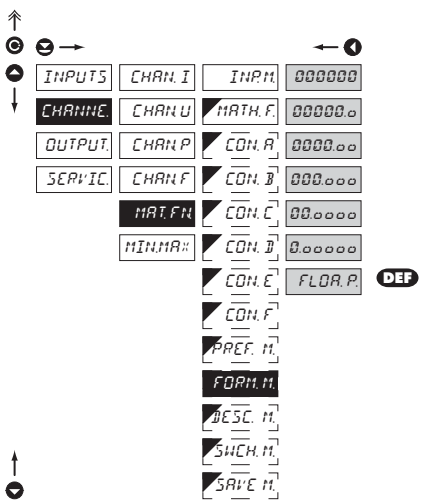


PREF. M. Select multiplying constant

- constant allows for another mathematic recalculation with option of extended projection of measuring units

m-MILI	Constant 0,001 prefix "m" added
- NULL	Constant 1 without prefix
K-KILO	Constant 1000 prefix "K" added

6.2.5d Mathematic functions - decimal point

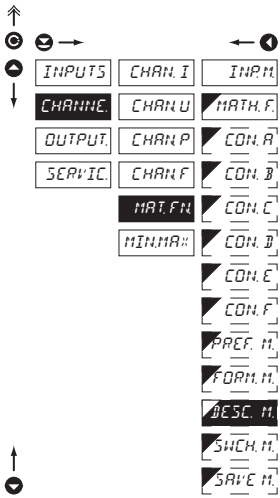


FORM.M. Selection of decimal point

- the instrument allows for classic projection of a number with positioning of the DP as well as projection with floating DP, allowing to display a number in its most exact form „FLOA.P."

000000.	Setting DP - XXXXXX.
00000.0	Setting DP - XXXXX.x
0000.00	Setting DP - XXXX.xx
000.000	Setting DP - XXX.xxx
00.0000	Setting DP - XX.xxxx
0.00000	Setting DP - X.xxxxx
FLOA.P.	Floating DP

6.2.5e Mathematic functions - measuring units



DESC.M. Setting projection of description for "MAT.FN"

- projection of mesured data may be extended (at the expense of the number of displayed places) by two characters for description
- description is set by shifted ASCII code, when two first places show the set description and two last characters their code in period 0...95
- description is cancelled by code 00

- **DEF** = no description

!

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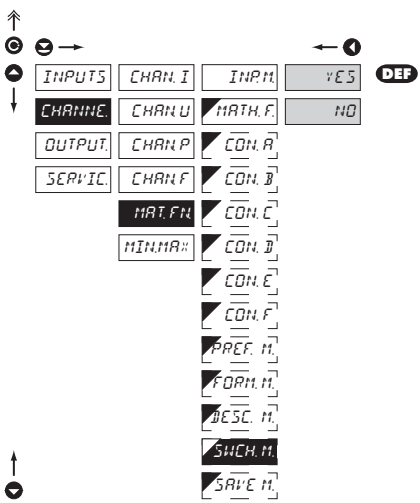
6.2.5f Select channel projection during switching



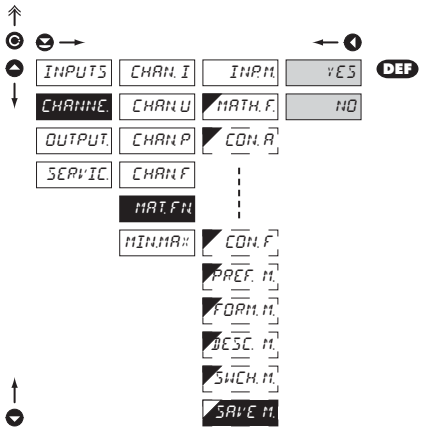
SWCH.M. Select channel projection during switching

- setting in this item enables the user to select individual measuring channels, which will be displayed during switching channel functions *„PREP. 1"*

YES — Projection permtted

NO — Projection prohibited

6.2.5f Mathematic functions - selection of storing data into instrument memory

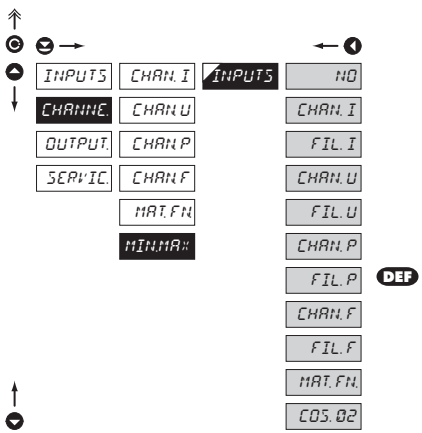


SAVE M. Selection of storing data into instrument memory

- by selection in this item you allow to register values into instrument memory
- another setting in item *"OUTPUT. > MEMORY"* (not in standard experiment)

YES	Measured data are stored in the memory
NO	Measured data are not stored

6.2.6 Selection of evaluation of min/max value

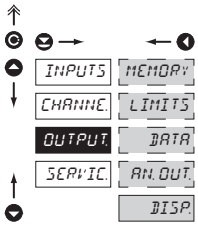


INPUTS Selection of evaluation of min/max value

- selection of value from which the min/max value will be calculated

NO	Evaluation of min/max value is off
CHAN.I	From "Channel I"
FIL.I	From "Channel I" after digital filters processing
CHAN.U	From "Channel U"
FIL.U	From "Channel U" after digital filters processing
CHAN.P	From "Channel P"
FIL.P	From "Channel P" after digital filters processing
CHAN.F	From "Channel F"
FIL.F	From "Channel F" after digital filters processing
MAT.FN.	From "Mathematic functions"
COS.02	From auxiliary channel „COS FI"

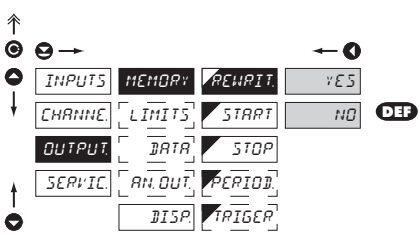
6.3 Setting „PROFI“ - OUTPUTS



In this menu it is possible to set parame ters of the instrument output signals

- MEMORY — Setting data logging into memory
- LIMITS — Setting type and parameters of limits
- DATA — Setting type and parameters of data output
- AN.OUT. — Setting type and parameters of analog output
- DISP. — Setting display projection and brightness

6.3.1a Selection of mode of data logging into instrument memory

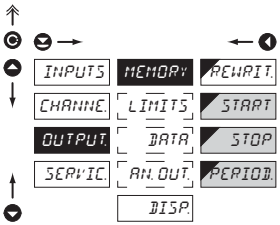


REWRIT. Selection of the mode of data logging

- selection of the mode in the event of full instrument memory

- NO — Rewriting values prohibited
- YES — Rewriting values permitted, the oldest get rewritten by the latest

6.3.1b Setting data logging into instrument memory - RTC



START Start of data logging into instrument memory

- time format HH.MM.SS

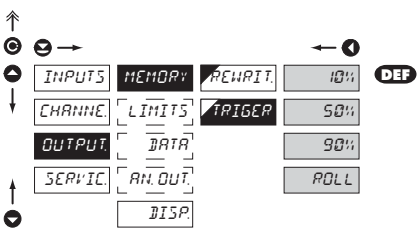
STOP Stop data logging into instrument memory

- time format HH.MM.SS

PERIOD. Period of data logging into instrument memory

- determines the period in which values will be logged in an interval delimited by the time set under items *START* and *STOP*
- time format HH.MM.SS
- records are made on a daily basis in selected interval and period
- item not displayed if "STORE" is selected in menu *(Input > EXT. IN.)*

6.3.1c Setting data logging into instrument memory - FAST



TRIGER **Setting logging data into inst. memory**

- logging data into inst. memory is governed by the folowing selection, which determines how many percent of the memory is reserved for data logging prior to initiation of trigger imputse
- initiation is on ext. input or control key

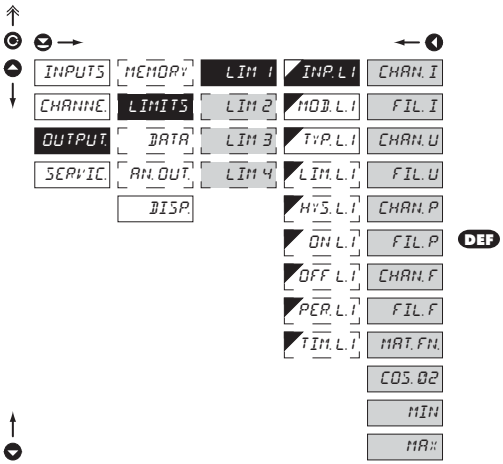
10% Reser. of 10 % memory prior init. of data logging

50% Reser. of 50 % memory prior init. of data logging

90% Reser. of 90 % memory prior init. of data logging

ROLL After initiation of data logging the memory is cyclically transcribed

6.3.2a Selection of input for limits evaluation



INP.L1 Selection evaluation of limits

- selection of value from which the limit will be evaluated

CHAN.I	From "Channel I"
FIL.I	From "Channel I" after digital filters processing
CHAN.U	From "Channel U"
FIL.U	From "Channel U" after digital filters processing
CHAN.P	From "Channel P"
FIL.P	From "Channel P" after digital filters processing
CHAN.F	From "Channel F"
FIL.F	From "Channel F" after digital filters processing
MAT.FN.	From "Mathematic functions"
COS.02	From auxiliary channel „COS FI"
MIN.	From "Min. value"
MAX.	From "Max. value"

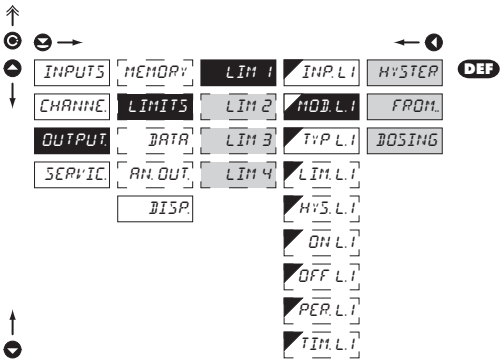
!

Setting is identical for LIM 2, LIM 3 and LIM 4

!

"COS. 02" is derived from "COS. FI." when the range -1...1 is tranferred to 0...2 for evaluation

6.3.2b Selection of type of limit



MOD.L.1 **Selection the type of limit**

HYSTER Limit is in mode "Limit, hysteresis, delay"

- for this mode the parameters of *"LIM. L."* are set, at which the limit will shall react, *"HYS. L."* the hysteresis range around the limit (LIM ±1/2 HYS) and time *"TIM. L."* determining the delay of relay switch-on

FROM. Frame limit

- for this mode the parameters are set for interval *"ON. L."* the relay switch-on and *"OFF. L."* the relay switch-off

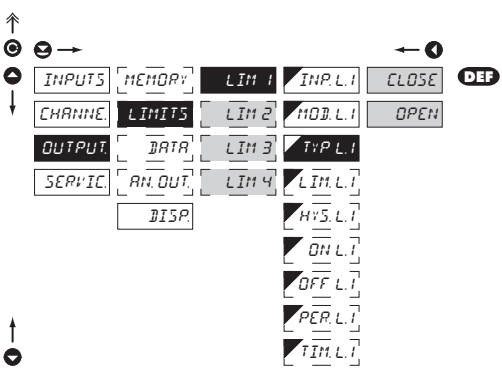
DOSING Dose limit (periodic)

- for this mode the parameters are set for *"PER. L."* determining the limit value as well as its multiples at which the output is active and *"TIM. L."* indicating the time during which is the output active

!

Setting is identical for LIM 2, LIM 3 and LIM 4

6.3.2c Selection of type of output



TYP.L.1 **Selection of type of output**

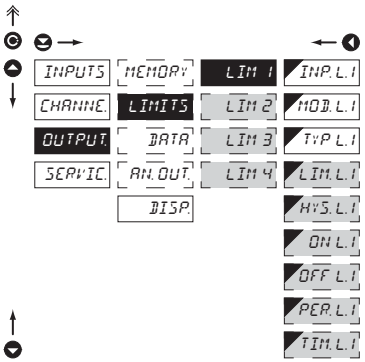
CLOSE Output switches on when condition is met

OPEN Output switches off when condition is met

!

Setting is identical for LIM 2, LIM 3 and LIM 4

6.3.2d Setting values for limits evaluation



!

Setting is identical for LIM 2, LIM 3 and LIM 4

LIM.L.1 Setting limit for switch-on
- for type *"HYSTER"*

HYS.L.1 Setting hysteresis
- for type *"HYSTER"*
- indicates the range around the limit (in both directions, LIM. ±1/2 HYS.)

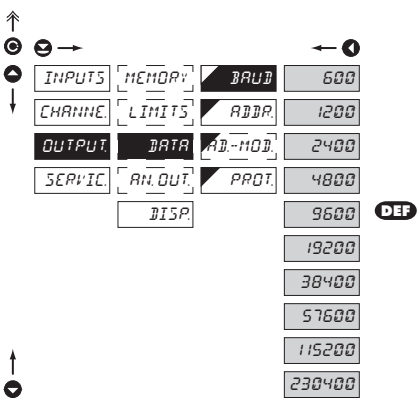
ON.L.1 Setting the outset of the interval of limit switch-on
- for type *"FROM"*

OFF.L.1 Setting the end of the interval of limit switch-on
- for type *"FROM"*

PER.L.1 Setting the period of limit switch-on
- for type *"DOSING"*

TIM.L.1 Setting the time switch-on of the limit
- for type *"HYSTER"* and *"DOSING*

6.3.3a Selection of data output baud rate



BAUD Selection of data output baud rate

600 Rate - 600 Baud

1200 Rate - 1 200 Baud

2400 Rate - 2 400 Baud

4800 Rate - 4 800 Baud

9600 Rate - 9 600 Baud

19200 Rate - 19 200 Baud

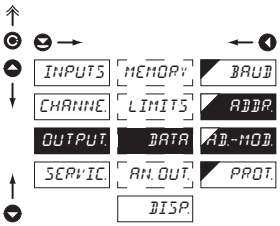
38400 Rate - 38 400 Baud

57600 Rate - 57 600 Baud

115200 Rate - 115 200 Baud

230400 Rate - 230 400 Baud

6.3.3b Setting instrument address



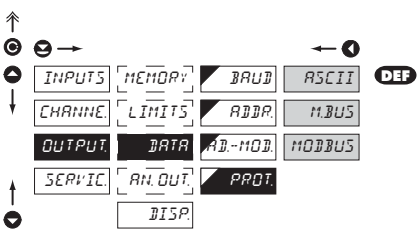
ADDR. Setting instrument address

- setting in range 0...31
- DEF = 00

AD.-MOD. Setting instrument address - MODBUS

- setting in range 1...247
- DEF = 1

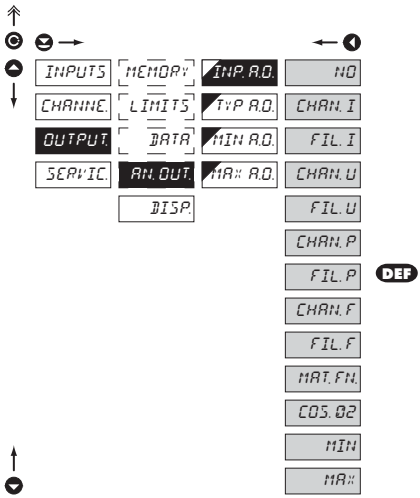
6.3.3c Selection of data output protocol



PROT. Selection of the type of analog output

- ASCII — Data protocol ASCII
- M.BUS — Data protocol DIN MessBus
- MODBUS — Data protocol MODBUS-RTU
- option is available only for RS 485

6.3.4a Selection of input for analog output



INP.A.O. Select evaluation of analog output

- select value from which analog output will be evaluated

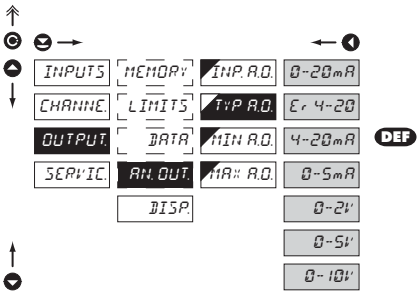
NO	AO evaluation is off
CHAN.I	From "Channel I"
FIL.I	From "Channel I" after digital filters processing
CHAN.U	From "Channel U"
FIL.U	From "Channel U" after digital filters processing
CHAN.P	From "Channel P"
FIL.P	From "Channel P" after digital filters processing
CHAN.F	From "Channel F"
FIL.F	From "Channel F" after digital filters processing
MAT.FN.	From "Mathematic functions"
COS.02	From auxiliary channel„COS FI"
MIN	AO evaluation from "Min.value"
MAX	AO evaluation from "Max.value"

DEF "Channel I" - FIL. I
DEF "Channel U" - FIL. U
DEF "Channell P" - FIL. P

!

"COS. 02" is derived from "COS. FI." when the range -1...1 is tranferred to 0...2 for evaluation

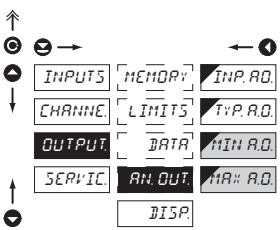
6.3.4b Selection of the type of analog output



TYP A.O. Selection of the type of analog output

- 0-20mA Type - 0...20 mA
- Er 4-20 Type - 4...20 mA
  - with indication of error statement (< 3,0 mA)
- 4-20mA Type - 4...20 mA
- 0-5mA Type - 0...5 mA
- 0-2V Type - 0...2 V
- 0-5V Type - 0...5 V
- 0-10V Type - 0...10 V

6.3.4c Setting the analog output range



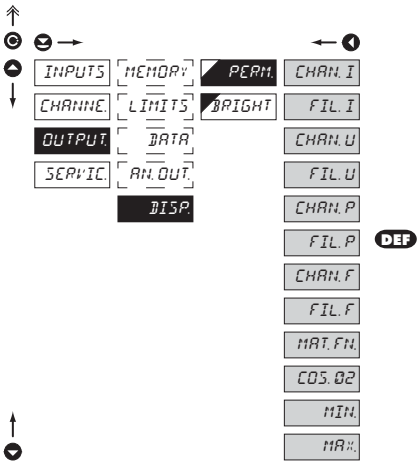
AN. OUT. Setting the analog output range

- analog output is isolated and its value corresponds with displayed data. It is fully programmable, i.e. it allows to assign the AO limit points to two arbitrary points of the entire measuring range

MIN A.O. Assigning the display value to the beginning of the AO range
- range of the setting is -99999...999999
- DEF = 0

MAX A.O. Assigning the display value to the end of the AO range
- range of the setting is -99999...999999
- DEF = 100

6.3.5a Selection of input for display projection



!

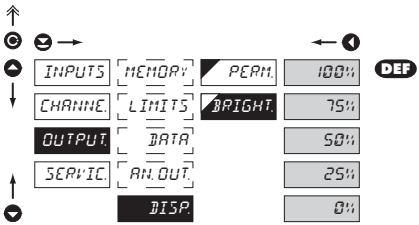
"COS. 02" is derived from "COS. FI." when the range -1...1 is tranferred to 0...2 for evaluation

PERM. Selection display projection

- selection of value which will be shown on the instrument display

CHAN.I	From "Channel I"
FIL.I	From "Channel I" after digital filters processing
CHAN.U	From "Channel U"
FIL.U	From "Channel U" after digital filters processing
CHAN.P	From "Channel P"
FIL.P	From "Channel P" after digital filters processing
CHAN.F	From "Channel F"
FIL.F	From "Channel F" after digital filters processing
MAT.FN.	From "Mathematic functions"
COS.02	From auxiliary channel „COS FI"
MIN.	From "Min. value"
MAX.	From "Max. value"

6.3.5b Selection of display brightness



BRIGHT Selection of display brightness

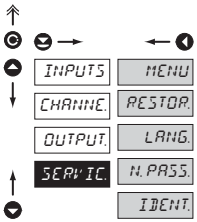
- by selecting display brightness we may appropriately react to light conditions in place of instrument location

0%	Display is off

- after keystroke display turns on for 10 s

25%	Display brightness - 25 %
50%	Display brightness - 50 %
75%	Display brightness - 75 %
100%	Display brightness - 100 %

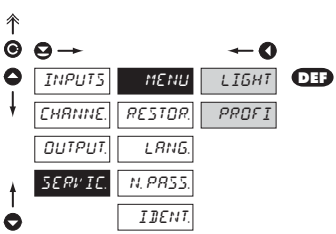
6.4 Setting "PROFI" - SERVICE



The instrument service functions are set in this menu

- MENU — Selection of menu type LIGHT/PROFI
- RESTOR. — Restore instrument manufacture setting and calibration
- LANG. — Language version of instrument menu
- N.PASS. — Setting new access password
- IDENT. — Instrument identification

6.4.1 Selection of type of programming menu



MENU — Selection of menu type - LIGHT/PROFI

- enables setting the menu complexity according to user needs and skills

LIGHT — Active LIGHT menu

- simple programming menu, contains only items necessary for configuration and instrument setting
- linear menu > items one after another

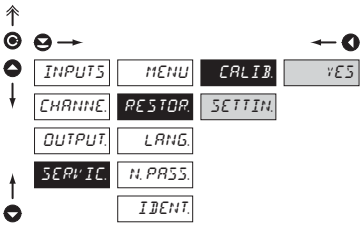
PROFI — Active PROFI menu

- complete programming menu for expert users
- tree menu

!

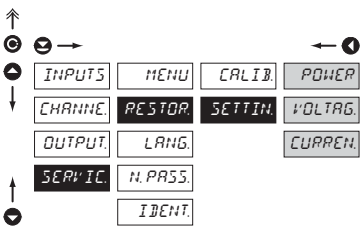
Change of setting is valid upon next access into menu

6.4.2 Restoration of manufacture setting



CALIB. Restoration of manufacture calibration of the instrument

- in the event of error setting or calibration it is possible to return to manufacture calibration. Prior to execution of changes you will be asked to confirm your selection „*YES*“



SETTIN. **Return to manufacture setting of the instrument**

- reading manufacture setting (items marked DEF)
- presetting “source” for further evaluation (e.g.: selection “VOLTAGE” > evaluation of limits, analog, min/max. value, etc... from “Channel U”
- prior to execution of changes you will be asked to confirm your selection „*YES*“

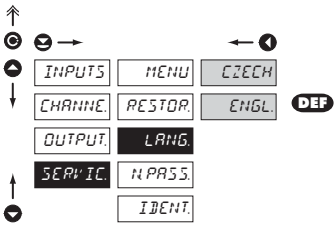
POWER Setting for power measuring - “Channel P”

VOLTAG. Setting for voltage measuring - “Channel U”

CURREN. Setting for measuring current “Channel I”

Jobs performed	Restore	
	Calibration	Setting
cancels USER menu rights	✓	✓
deletes table of items order in USER - LIGHT menu	✓	✓
adds items from manufcture to LIGHT menu	✓	✓
deletes data stored in FLASH	✓	✓
cancels or linearization tables	✓	✓
clears tare	✓	✓
clears conduct resistances	✓	✓
restore manufacture calibration	✓	✘
restore manufacture setting	✘	✓

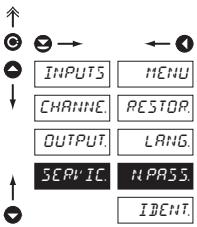
6.4.3 Selection of instrument menu language version



LANG. Selection of instrument menu language version

- CZECH — Instrument menu is in Czech
- ENGL. — Instrument menu is in English

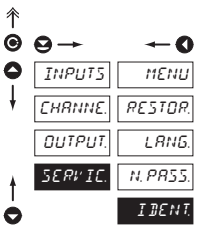
6.4.4 Setting new access password



N.PASS. Setting new password for access to LIGHT and PROFI menu

- this selection enables changing number code that blocks the access into LIGHT and PROFI Menu.
- range of the number code is 0...9999
- universal password in the event of loss is „8177"

6.4.5 Instrument identification



IDENT. Projection of instrument SW version

- display shows type identification of the instrument, SW number, SW version and current input setting (Mode)
- if the SW version reads a letter on first position, it is a customer SW

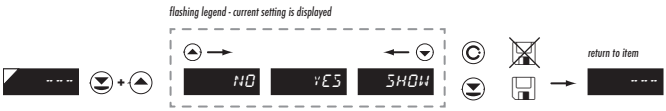
7.0 Setting items into "USER" menu

- **USER** menu is designed for users who need to change only several items of the setting without the option to change the primary instrument setting (e.g. repeated change of limit setting)
- there are no items from manufacture permitted in **USER** menu
- on items indicated by inverse triangle

- setting may be performed in **LIGHT** or **PROFI** menu, with the **USER** menu then overtaking the given menu structure

- **For user operation**
- **Menu items are set by the user (Profi/Light) as per request**
- **Access is not password protected**

Setting



item will not be displayed in USER menu

item will be displayed in USER menu with editing option

item will be solely displayed in USER menu

Setting sequence of items in "USER" menu

In compiling USER menu from active LIGHT menu the items (max. 10) may be assigned a sequence, in which they will be projected in the menu

Example:

Into USER menu were selected these items

(keys +) > *CL. TAR.*, *LIM 1*, *LIM 2*, *LIM 3*, for which we have preset this sequence (keys +):

CL. TAR.	*5*
LIM 1	0 (sequence not determined)
LIM 2	2
LIM 3	1

Upon entering USER menu

(key) items will be projected in the following sequence: LIM 3 > LIM 2 > CL.TAR. > LIM 1

The instruments communicate via serial line RS232 or RS485. For communication they use the ASCII protocol. Communication runs in the following format:

ASCII: 8 bit, no parity, one stop bit
DIN MessBus: 7 bit, even parity, one stop bit

The transfer rate is adjustable in the instrument menu. The instrument address is set in the instrument menu in the range of 0 ÷ 31. The manufacture setting always presets the ASCII protocol, rate of 9600 Baud, address 00. The type of line used - RS232 / RS485 - is determined by an output board automatically identified by the instrument.

The commands are described in specifications you can find at na www.orbit.merret.cz/rs or in the OM Link program.

DETAILED DESCRIPTION OF COMMUNICATION VIA SERIAL LINE

Event	Type	Protocol		Transmitted data												
Data solicitation (PC)	232	ASCII		#	A	A	<CR>									
		MessBus		No - data is transmitted permanently												
	485	ASCII		#	A	A	<CR>									
		MessBus		<SADR>	<ENQ>											
Data transmission (instrument)	232	ASCII		>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>	
		MessBus		<SADR>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>
	485	ASCII		>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>	
		MessBus		<SADR>	D	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>
Confirmation of data acceptannce (PC) - OK	485	MessBus		<DLE>	1											
Confirmation of data acceptance (PC) - Bad				<NAK>												
Sending address (PC) prior command				<EADR>	<ENQ>											
Confirmation of address (instrument)				<SADR>	<ENQ>											
Command transmission (PC)	232	ASCII		#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>
		MessBus		<STX>	$	N	P	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>		
	485	ASCII		#	A	A	N	P	(D)	(D)	(D)	(D)	(D)	(D)	(D)	<CR>
		MessBus		<SADR>	$	N	P	(D)	(D)	(D)	(D)	(D)	<ETX>	<BCC>		
Command confirmation (instrument)	232	ASCII	OK	!	A	A	<CR>									
			Bad	?	A	A	<CR>									
		Messbus		No - data is transmitted permanently												
	485	ASCII	OK	!	A	A	<CR>									
			Bad	?	A	A	<CR>									
		MessBus	OK	<DLE>	1											
			Bad	<NAK>												
Command confirmation (inst.) - OK	485	MessBus		!	A	A	<CR>									
Command confirmati (instrument) - Bad				?	A	A	<CR>									
Instrument identification				#	A	A	1Y	<CR>								
HW identification				#	A	A	1Z	<CR>								
One-time transmission				#	A	A	7X	<CR>								
Repeated transmission				#	A	A	8X	<CR>								

LEGEND

#	35	23_H	Command beginning
A A	0...31		Two characters of instrument address (sent in ASCII - tens and units, e.g. "01", "99" universal
<CR>	13	$0D_H$	Carriage return
<SP>	32	20_H	Space
N, P			Number and command - command code
D			Data - usually characters "0"..."9", "-", "."; (D) - dp. and (-) may prolong data
R	30_H...$3F_H$		Relay and tare status
!	33	21_H	Positive confirmation of command (ok)
?	63	$3F_H$	Negative confirmation of command (point)
>	62	$3E_H$	Beginning of transmitted data
<STX>	2	02_H	Beginning of text
<ETX>	3	03_H	End of text
<SADR>	addresa +60_H		Prompt to send from address
<EADR>	addresa +40_H		Prompt to accept command at address
<ENQ>	5	05_H	Terminate address
<DLE>1	16 49	10_H 31_H	Confirm correct statement
<NAK>	21	15_H	Confirm error statement
<BCC>			Check sum -XOR

RELAY, TARE

Sign	Relay 1	Relay 2	Tare	Change relay 3/4
P	0	0	0	0
Q	1	0	0	0
R	0	1	0	0
S	1	1	0	0
T	0	0	1	0
U	1	0	1	0
V	0	1	1	0
W	1	1	1	0
p	0	0	0	1
q	1	0	0	1
r	0	1	0	1
s	1	1	0	1
t	0	0	1	1
u	1	0	1	1
v	0	1	1	1
w	1	1	1	1

Relay status is generated by command #AA6X <CR>.

The instrument immediately returns the value in the format >HH <CR>, where HH is value in HEX format and range 00_H...FF_H. The lowest bit stands for „Relay 1", the highest for „Relay 8"

ERROR	CAUSE	ELIMINATION
E. D. U n.	Number is too small (large negative) to be displayed	change DP setting, channel constant setting
E. D. O v.	Number is too large to be displayed	change DP setting, channel constant setting
E. T. U n.	Number is outside the table range	increase table values, change input setting (channel constant setting)
E. T. O v.	Number is outside the table range	increase table values, change input setting (channel constant setting)
E. I. U n.	Input quantity is smaller than permitted input quantity range	change input signal value or input (range) setting
E. I. O v.	Input quantity is larger than permitted input quantity range	change input signal value or input (range) setting
E. HW	A part of the instrument does not work properly	send the instrument for repair
E. EE	Data in EEPROM corrupted	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E. DATA	Data in EEPROM outside the range	perform restoration of manufacture setting, upon repeated error statement send instrument for repair
E. CLR.	Memory was empty (presetting carried out)	upon repeated error statement send instrument for repair, possible failure in calibration

The instrument allows to add two descriptive characters to the classic numeric formats (at the expense of the number of displayed places). The setting is performed by means of a shifted ASCII code. Upon modification the first two places display the entered characters and the last two places the code of the relevant symbol from 0 to 95. Numeric value of given character equals the sum of the numbers on both axes of the table.
Description is cancelled by entering characters with code 00

	0	1	2	3	4	5	6	7
0								
8								
16								
24								
32								
40								
48								
56								
64								
72								
80								
88								

	0	1	2	3	4	5	6	7
0		!	"	#	$	%	&	'
8	(	)	*	+	,	-	.	/
16	0	1	2	3	4	5	6	7
24	8	9	VA	Vr	<	=	>	?
32	@	A	B	C	D	E	F	G
40	H	I	J	K	L	M	N	O
48	P	Q	R	S	T	U	V	W
56	X	Y	Z	[	\	]	^	_
64	`	a	b	c	d	e	f	g
72	h	i	j	k	l	m	n	o
80	p	q	r	s	t	u	v	w
88	x	y	z	{	|	}	~	

INPUT

Range is adjustable depending on the order

Voltage:	0...10 V	150 kOhm	Input 2 - U
	0...120 V	930 kOhm	Input 3 - U
	0...250 V	730 kOhm	Input 2 - U
	0...450 V	930 kOhm	Input 3 - U
Current:	0...60 mV	21 kOhm	Input 1 - I
	0...150 mV	21 kOhm	Input 1 - I
	0...300 mV	21 kOhm	Input 1 - I
	0...1 A	< 150 mV	Input 1 - I
	0...2,5 A	< 150 mV	Input 1 - I
	0...5 A	< 150 mV	Input 1 - I

Input frequency: 0...400 Hz (up to amplitude 8 V)

Measured quantities
- Voltage (V_{RMS})
- Current (A_{RMS})
- Active power (P)
- Frequency (Hz)

swith calclation
- Idle power (Q)
- Apparent power (S)
- Power factor (cos φ)

PROJECTION

Display: 999999, intensive red or green
14-ti segment LED, digit height 14 mm
Projection: ±9999 (-99999...999999)
Decimal point: adjustable - in menu
Brightness: adjustbale - in menu

INSTRUMENT ACCURACY

TK:	100 ppm/°C	
Accuracy:	±0,3 % of range + 1 digit	U, I, P, F
	±0,6 % of range + 1 digit	S
	±0,9 % of range + 1 digit	Q, Cos Fi

Above accuracies apply for rate 2,5 meas./s

Rate: 0,6...5 measurements/s
Overload capacity: 10x (t < 100 ms) not for 450 V and 5 A,
2x (long-term)
Linearisation: by linear interpolation in 50 points
- solely via OM Link

Digital filters: Averaging, Floating average, Exponential filter, Rounding
Functions: Tare - display resetting
Hold - stop measuring (at contact)
Lock - control key locking
MM - min/max value
Mathematic functions
OM Link: company communication interface for setting, operation and update of instrument SW
Watch-dog: reset after 400 ms
Calibration: at 25°C and 40 % of r.h.

COMPARATOR

Type: digital, adjustable in menu
Mode: Hysteresis, From, Dosing
Limita: -99999...999999
Hysteresis: 0...999999
Delay: 0...99,9 s
Outputs: 2x relays with switch-on contact (Form A)
(230 VAC/30 VDC, 3 A)*
2x relays with switch-off contact (Form C)
(230 VAC/50 VDC, 3 A)*
2x SSR (250 VAC/ 1 A)*
2x/4x open collector (30 VDC/100 mA)
2x bistabil relays (250 VAC/250 VDC, 3 A/0,3 A)*
Relay: 1/8 HP 277 VAC, 1/10 HP 125 V, Pilot Duty D300

DATA OUTPUTS

Protocols: ASCII, DIN MessBus, MODBUS, PROBUS
Data format: 8 bit + no parity + 1 stop bit (ASCII)
7 bit + even parity + 1 stop bit (MessBus)
Rate: 600...230 400 Baud
RS 232: isolated, two-way communication
RS 485: isolated, two-way communication,
addressing (max. 31 instruments)
PROFIBUS Data protocol SIEMENS

ANALOG OUTPUTS

Type: isolated, programmable with resolution of max.10 000 points, analog output corresponds with displayed data, type and range are adjustable
Non-linearity: 0,2 % of range
TC: 100 ppm/°C
Rate: response to change of value < 150 ms
Voltage: 0...2 V/5 V/10 V
Curernt: 0...5/20 mA/4...20 mA
- compensation of conduct to 500 Ohm/12 V
or 1 000 Ohm/24 V

MEASURED DATA RECORD

Type RTC: time-controlled logging of measured data into instrument memory, allows to log up to 250 000 values
Type FAST: fast data logging into instrument memory, allows to log up to 8 000 values at a rate of 40 records/s
Transmission: via data output RS 232/485 or via OM Link

** values apply for resistance load*

POWER SUPPLY

Options:	10...30 V AC/DC, 10 VA, isolated, - fuse inside (T 4000 mA) 80...250 V AC/DC, 10 VA, isolated - fuse inside (T 630 mA)

MECHANIC PROPERTIES

Material:	Noryl GFN2 SE1, incombustible UL 94 V-I
Dimensions:	96 x 48 x 120 mm
Panel cut-out:	90,5 x 45 mm

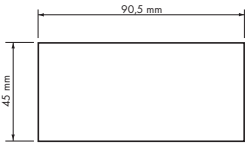
OPERATING CONDITIONS

Connection:	connector terminal board, conductor cross-section <1,5 mm^2 /<2,5 mm^2
Stabilisation period:	within 15 minutes after switch-on
Working temp.:	0°...60°C
Storage temp.:	-10°...85°C
Cover:	IP65 (front panel only)
Construction:	safety class I
Overvoltage category:	EN 61010-1, A2
Insulation resistance:	for pollution degree II, measurement category III instrum.power supply > 670 V (PI), 300 V (DI) Input/output > 300 V (PI), 150 (DI)
EMC:	EN 61000-3-2+A12; EN 61000-4-2, 3, 4, 5, 8, 11; EN 550222, A1, A2

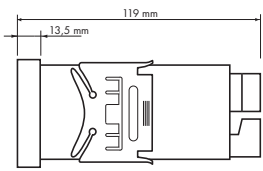
PI - Primary insulation, DI - Double insulation

Front view

Panel cut



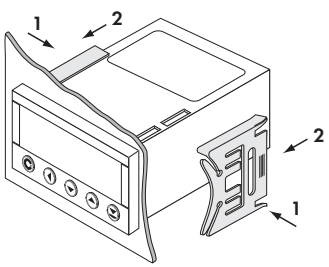
Side view

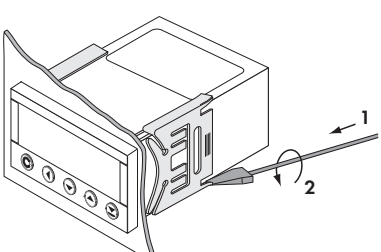


Panel thickness: 0,5...20 mm

Instrument installation

1. insert the instrument into the panel cut-out
2. fit both travellers on the box
3. press the travellers close to the panel





Instrument disassembly

1. slide a screw driver under the traveller wing
2. turn the screw driver and remove the traveller
3. take the instrument out of the panel

Product	**OM 402PWR**
Type	. . . . .
Manufacturing No.	. . . . .
Date of sale	. . . . .

A guarantee period of 60 months from the date of sale to the user applies to this instrument.
Defects occuring during this period due to manufacture error or due to material faults shall be eliminated free of charge.

For quality, function and construction of the instrument the guarantee shall apply provided that the instrument was connected and used in compliance with the instructions for use.

The guarantee shall not apply to defects caused by:

- mechanic damage
- transportation
- intervention of unqualified person incl. the user
- unavoidable event
- other unprofessional interventions

The manufacturer performs guarantee and post.guarantee repairs unless provided for otherwise.

Stamp, signature

DECLARATION OF CONFORMITY

Company: **ORBIT MERRET, spol. s r.o.**
Klánova 81/141, 142 00 Prague 4, Czech Republic, IDNo: 00551309

Manufactured: **ORBIT MERRET, spol. s r.o.**
Vodňanská 675/30, 198 00 Prague 9, Czech Republic

declares at its full responsibility that the product presented hereunder meets all technical requirements, is safe for use when utilised under the terms and conditions determined by ORBIT MERRET, spol.s r.o. and that our company has taken all measures to ensure conformity of all products of the type listed hereunder, which are being brought out to the market, with technical documentation and requirements of the appurtenant statutory orders.

Product: 4-digit programmable panel instrument

Type: **OM 402**

Version: UNI, PWR

Conformity is assessed pursuant to the following standards:

El. safety:	EN 61010-1	
EMC:	EN 50131-1, chapter 14 and chapter 15	
	EN 50130-4, chapter 7	EN 61000-4-11
	EN 50130-4, chapter 8	EN 61000-4-11
	EN 50130-4, chapter 9	EN 61000-4-2
	EN 50130-4, chapter 10	EN 61000-4-3
	EN 50130-4, chapter 11	EN 61000-4-6
	EN 50130-4, chapter 12	EN 61000-4-4
	EN 50130-4, chapter 13	EN 61000-4-5
	EN 50130-5, chapter 20	
	prEN 50131-2-1, par. 9.3.1	
	EN 61000-4-8	
	EN 61000-4-9	
	EN 61000-3-2 ed. 2:2001	
	EN 61000-3-3: 1997, Cor. 1:1998, Z1:2002	
	EN 55022, chapter 5 and chapter 6	
and Ordinance on:		
El. safety:	No. 168/1997 Coll.	
EMC:	No. 169/1997 Coll.	

The evidence are the protocols of authorized and accredited organizations:
VTÚE Praha, experimental laboratory No. 1158, accredited by ČIA
VTÚPV Vyškov, experimental laboratory No. 1103, accredited by ČIA

Place and date of issue: Prague, 18. March 2006

Miroslav Hackl v.r.
Company representative

Mode of asses. of conformity §12, par. 4 b, d Act No. 22/1997 Coll.